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An Electrofishing Survey of the Illinois River, 1959-1974

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Richard E. Sparks is an Assistant Aquatic Biologist, and the late William C. Starrett was an Aquatic Biologist, at the Illinois Natural History Survey.

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FROM AS FAR BACK as historical accounts are available, the Illinois River Valley has been described as unusually productive of fish and wildlife. The French explorer Marquette wrote in 1673 (Mills, Starrett, & Bellrose 1966: 3-4):

> "We have seen nothing like this river that we enter, as regards to its fertility of soil, its prairies and woods; its cattle, elk, deer, wildcats, bustards, swans, ducks, parroquets, and even beaver."

When Illinois was still a territory, the Illinois River Valley was considered one of the important sources of furs in the northwest part of the United States (Starrett 1972:139). There are older residents of the valley who recall the importance of fish and wildlife to some of the river towns in the early part of the century. Hugh Bell, Superintendent of the Illinois Department of Conservation Fisheries Field Headquarters at Havana, as a young man worked at filling specially constructed tank cars with fish to be shipped by rail from Havana to Chicago. At one time live fish also were shipped regularly to Boston and New York, and the Illinois River ranked as a major inland commercial fishery. There was a U.S. government fisheries station at Meredosia (Forbes & Richardson 1920:XVI). During that same period a train called the Fisherman's Special ran between Springfield and Havana, and there were many people in Havana who made their living outfitting and guiding fishermen and duck hunters.

Because of their importance as unique resources, the Illinois River and its bottomland lakes were studied intensively by the Illinois State Laboratory of Natural History and its successor, the Natural History Survey, from 1874 to 1927 (Forbes 1928:387). More recently, surveys of the fish populations of the river have been conducted regularly from the 1940's to the present. Various types of sampling gear have been employed in these surveys, for various purposes. For example, minnow seines were used regularly in midsummer to collect small fish and thereby gauge the spawning success of species which spawn in the spring. Hoop nets were used to collect large fish in backwaters and bottomland lakes. The present report concerns primarily the electrofishing surveys, which have been conducted regularly in the Illinois River in the fall, from 1959 through 1974.

ACKNOWLEDGMENTS

The electrofishing survey of the Illinois River was conceived and carried out, for the most part, by Dr. William C. Starrett, Aquatic Biologist, Havana Field Laboratory, Illinois Natural History Survey. Dennis L. Dooley worked on the electrofishing survey, and other Illinois River studies, for 9 years. Robert Crompton, Howard Crum, and Ron Barker also assisted in the project under Dr. Starrett's direction.

Following Dr. Starrett's death in December, 1971, the electrofishing survey was resumed in 1973 by the writer and Kenneth Walker, with assistance in locating stations and following previously established methods from Mr. Dooley. Carl M. Thompson assisted with the 1974 electrofishing and helped compile and analyze data for this report.

We thank Lloyd LeMere for drawing the figures, Dr. R. Weldon Larimore for reviewing the manuscript, O. F. Glissendorf for final editing, and Judith L. Breckenridge who did the typing. We are grateful to all the students and other assistants who helped with the program from 1959 through 1974.

Finally, the electrofishing survey could not have been continued in 1974 without the support of the St. Louis District and the Waterways Experiment Station of the U.S. Army Corps of Engineers.

PROCEDURE

Twenty-four sampling sites were chosen in 1959 that provided good habitat for adult fish and that were fairly well distributed throughout the length of the river (Table 1). The same sites were usually sampled in succeeding years, except that one additional station, Big Blue Island Chute, was sampled in 1974. Most of the sites are in chutes, that is, side channels of the river, and contain brush piles, undercut banks, and "holes" where various species of fish are apt to congregate. The four exceptions to this general description are (1) the station above Pekin where both sides of the main channel were fished, (2) the station along the shore of Lower Peoria Lake, (3) the station in Middle Peoria Lake where docks and riprapping in various marinas were fished in the 1960's and where riprapping at a state conservation landing in Detweiller Park was fished in the 1970's, and (4) a station in the Des Plaines River where the wide mouth of the Du Page River and a boatyard were fished. The stations are located most accurately by river mile*—the exact number of miles upstream from the mouth of the river at Grafton, based on the Corps of Engineers' chart book of the Illinois Waterway (U.S. Army Engineer District, Chicago 1970). A river mile designation shows the approximate area that was fished. For example, at the first station listed in Table 1, we fished that part of Mortland Island Chute which extended from mile 18.7 to mile 19.4.

Pools in Table 1 refer to the waters impounded behind the dams and locks for navigation. Throughout this paper, references are made to these pools as convenient geographic locations of the various sections of the river. The lower part of the Illinois River is under the influence of the Alton Dam on the Mississippi. The dams forming the other pools, in upstream order, are: La Grange (river mile 80.2), Peoria (mile 157.6), Starved Rock (mile 231.0), Marseilles (mile 247.0), and Dresden (mile 271.5). Because the upstream pools are shorter than the downstream ones, there are fewer stations in the upstream pools.

The Illinois River begins at the confluence of the Des Plaines and Kankakee Rivers, and a distance of only 1.4 miles (2.25 km) separates the confluence and Dresden Dam. The Dresden Pool extends into the Des Plaines and Kankakee Rivers, and our one sampling station in the Dresden Pool is actually located in the Des Plaines River. The Kankakee is a relatively unpolluted stream, while the Des Plaines River receives municipal and industrial effluents from the Chicago metropolitan area, via the Chicago Sanitary and Ship Canal. The Des Plaines station is excluded when results from the Illinois River stations are used to compute average yearly catches per unit effort for the whole Illinois River (Tables 3–27).

The navigation dams help to maintain a 2.74-m deep navigation channel by impounding water during low-flow periods. When the water is thus impounded the river behind the dam is said to be at pool stage. In order to sample under similar environmental conditions from year to year, electrofishing was conducted at the same time every year, from late August to the middle of October, and only when the river was in pool behind each of the navigation dams. Not all stations could

* Stations are located by river miles rather than by kilometers because existing river charts and navigation aids along the river use mileages.

be fished every year, because of high water levels, and no stations were fished in 1971 and 1972 due to high water. In addition, the Des Plaines River station was fished only in 1959, 1962, 1973, and 1974, because it is not part of the Illinois River proper and was omitted whenever there was a limited amount of time available for sampling.

Several physical-chemical measurements were made at each station before sampling of the fish populations began. Dissolved oxygen concentrations at a depth of .91 m and at the bottom in the deepest part of the station were measured by the Winkler azide method and, in 1974, with a YSI Model 57 dissolved oxygen meter. Surface water and air temperatures were measured with a mercury thermometer. Wind direction and velocity and cloud cover were noted. Transparency was measured with a Secchi disk. In addition, turbidity of the river was measured with a Jackson turbidimeter during some surveys.

Fish populations were sampled by means of electrofishing. Fish were stunned by an electric current produced by a 230-volt, 180 cycles/sec, AC generator (Homelite 9HY-1), and transmitted through the water via three cables suspended from booms in the front of a 5.49-m aluminum boat. The stunned fish were dipped from the water and placed in plastic garbage cans containing water. Electrofishing was conducted in 15-minute segments, and a total of 60 minutes was spent electrofishing at most stations. In small chutes, or where an abundance of fish was collected quickly, only 30 minutes were spent electrofishing. Fish were identified, counted, weighed, checked for disease, and returned to the river. The few fish that died were buried on shore.

RESULTS

PHYSICAL-CHEMICAL RESULTS

Physical-chemical results for the fall of 1974 are shown in Table 2. Since the dissolved oxygen levels at both the .91-m depth and on the bottom were approximately the same at every station, the water was presumably well mixed. The dissolved oxygen concentration was 77–97 percent of saturation in the Alton Pool, 65–122 percent of saturation in La Grange and Peoria Pools, and 47–104 percent of saturation in Starved Rock, Marseilles, and Dresden Pools. At Ballard Island Chute (mile 247.8–248.2) and in Lower Peoria Lake (mile 163.0–163.4), the atypically high oxygen values (greater than saturation) were probably due to algal photosynthesis, since the waters had a greenish or brownish tinge. Ballard Island Chute is shallow, and has a large surface area, slow current, and a very dissected shoreline, with many marshy blind pockets. Thus, it should be a likely spot for phytoplankton to develop. The Secchi disk visibility here was much lower than in the river, although some of the turbidity on the sampling date can be attributed to wave action on the shallow bottom, as well as to phytoplankton.

The upper river in 1974 was generally more transparent, as measured by the Secchi disk, than the lower river. Starrett (1971:273) found that turbidity readings with a Jackson turbidimeter were higher in the lower three pools than in the upper three pools in the period 1963–1966. The Alton, La Grange, and Peoria Pools are generally more turbid than the upper pools, presumably because the lower pools have soft mud bottoms and receive heavy silt loads from tributary streams that drain agricultural areas. The river above Hennepin (mile 207.5) generally has a rocky bottom, although the rock is overlaid with mud, sand, and/or gravel in some sections.

Towboats (several barges pushed by a diesel-powered boat) have a marked effect on turbidity in the Illinois River. Fig. 1 shows that the turbidity in mid-channel at mile 25.9 was increased by about 100 Jackson turbidimeter units (JTU) as towboats passed on three

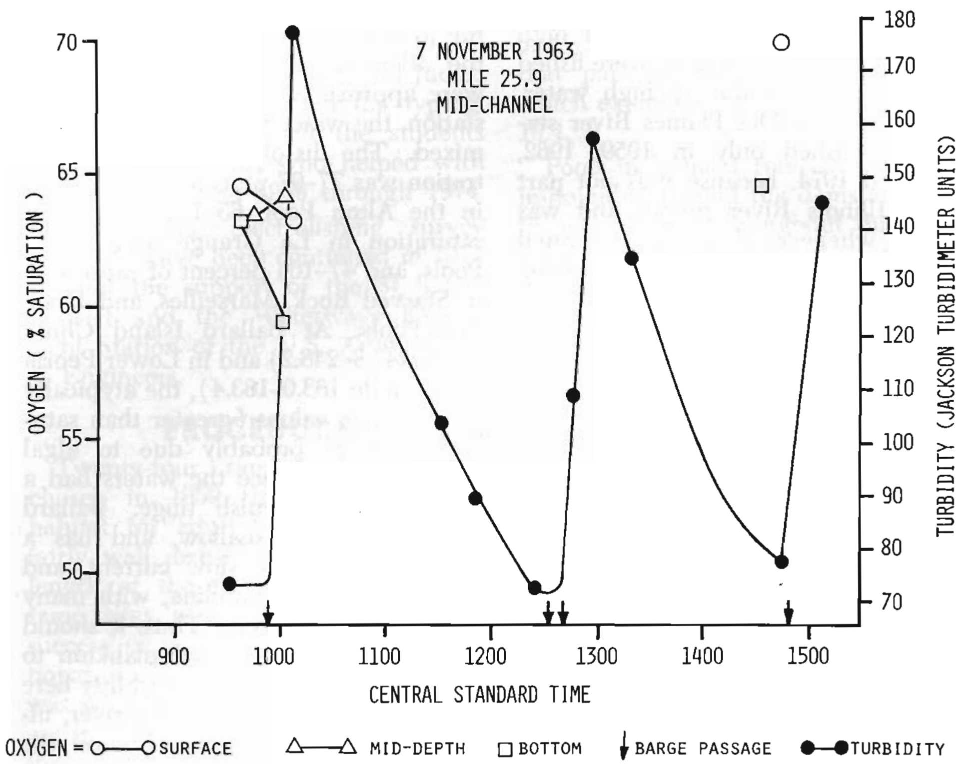


Fig. 1.—Dissolved oxygen concentrations and turbidity in the middle of the navigation channel of the Illinois River at mile 25.9, during passages of towboats on 7 November, 1963. Symbols for dissolved oxygen are circles for at the surface, triangles for at mid-depth, and squares for at the bottom. Turbidity is indicated with black dots. The time at which each towboat passed mile 25.9 is marked by an arrow.

occasions on 7 November, 1963. It took approximately 2½ hours for the turbidity to return to background levels following passage of towboats.

A Natural History Survey crew took a few dissolved oxygen readings in midchannel on 6 and 7 November, 1963, before, during, and after towboats had passed (Fig. 1 and 2). One might expect turbulence from movement of the hulls and from the propellers to aerate the water. Surprisingly, oxygen levels at the surface declined and then recovered following passage of a towboat on 6 November. On 7 November, oxygen levels at both the surface and bottom declined. The declines are significant; oxygen levels at the surface on 6 November and at the bottom on 7 November declined by 0.4 mg/l, and the standard deviation of the method used (azide modification of the Winkler method) is 0.1 mg/l, even in the presence of appreciable interference. The decline in dissolved oxygen and the increase in turbidity are both attributable to the resuspension of sediment caused by towboats moving in the relatively shallow navigation channel (2.74 m deep). Sediments in the Illinois River exert an appreciable oxygen demand, and the demand increases 7-fold to 10-fold when the sediments are disturbed. For example, Butts (1974:12) reported an oxygen demand of 2.8 $g/m^2/day$ for sediment at mile 198.8, under quiescent conditions, and 20.7 $g/m^2/day$ when the sediments were disturbed. The disturbance was produced by water current within a special chamber which Butts had constructed to measure *in*

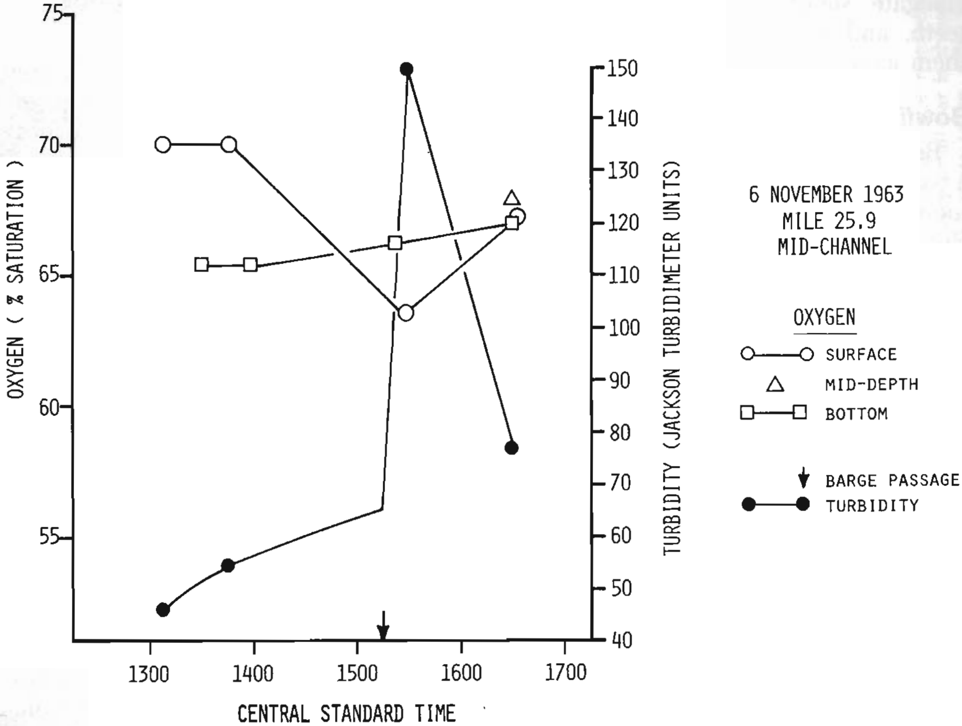


Fig. 2.—The effects of towboat passage on dissolved oxygen concentrations and turbidity at the same location on 6 November, 1963. The symbols are the same as in Fig. 1.

situ oxygen demand, and could logically be equated to the effects of disturbances created by barges (Butts 1974:6).

It is not known why oxygen levels increased slightly at the bottom on 6 November, and at mid-depth on 7 November, following passage of towboats. It may be that turbulence from towboats results in uneven mixing of parcels of water aerated by turbulence with parcels of water deoxygenated by resuspended sediment.

The water temperatures in Starved Rock, Marseilles, and Dresden Pools were generally higher than in the upper part of Peoria Pool, even though the readings in the upper pools were taken 2 weeks later and the weather had turned colder. The upper river is evidently warmer because of warm industrial and municipal discharges. Starrett (1971:370–373) reported the same trend of warmer temperatures in the upper river in July and August, 1966.

ELECTROFISHING RESULTS

The electrofishing results for those species that were frequently taken are presented below in phylogenetic order.

Shortnose Gar (Table 3)

Table 3 shows that shortnose gar (*Lepisosteus platostomus*) were occasionally taken in the three downstream pools, but never taken in the three upstream pools. Judging by the reports of commercial fishermen, shortnose gar are more abundant in the downstream pools than our records indicate, and these fish are probably less vulnerable to electric shock than other species. Although garfish are listed in the commercial catch from the Illinois River (Table 28) most fishermen consider them a nuisance because they easily become entangled in nets, with their elongate snout and numerous sharp teeth, and there is little demand for them as a food fish.

Bowfin (Table 4)

Bowfin (*Amia calva*) is considered a commercial species, but was not common in the Illinois River collections. Bowfin were taken as far upstream as Peoria Pool only in 1961, and otherwise were restricted to collections from La Grange and Alton Pools. Bowfin taken from Alton Pool in 1974 were in breeding color.

Gizzard Shad (Table 5)

Gizzard shad (*Dorosoma cepedianum*) were most abundant in La Grange and Peoria Pools and were generally abundant in our collections in all pools of the river. The numbers and pounds reported in Table 5 do not begin to reflect the actual abundance of the species, for two reasons. One is that small gizzard shad are stunned only momentarily by the electric shock, and usually get away before they can be netted. The second is that so many gizzard shad usually appear that it is futile to try to net them all, and our netting efforts are concentrated on the other species.

Gizzard shad are neither a commercial nor a game species, but small shad are valuable forage for largemouth bass, crappies, and even species such as drum, which ordinarily prefer molluscs when they are available.

Shad are sensitive to low oxygen and probably sensitive to cold temperatures, and die-offs of gizzard shad sometimes occur in the bottomland lakes and backwaters in midsummer and usually occur in winter. Nevertheless, because of their high reproductive capacity, gizzard shad populations do not seem to be much affected by these die-offs.

Goldeye, Mooneye (Tables 6 and 7 — Discussed under "Species Infrequently Taken")

Goldfish, Carp x Goldfish Hybrids (Tables 8 and 9)

Goldfish (*Carassius auratus*) were probably introduced into the Illinois River between 1908 and 1935; Forbes & Richardson do not mention them in The Fishes of Illinois (1920) and O'Donnell (1935) mentions that they occur frequently in the Illinois River. O'Donnell (1935) also mentions that two carp x goldfish hybrids were taken at Peoria.

Goldfish and carp x goldfish hybrids were generally abundant in the Des Plaines and upper Illinois electrofishing collections from 1959 through 1974 (Fig. 3 and 4). Goldfish were usually most abundant in Dresden, Marseilles, and Starved Rock Pools, and carp x goldfish were most abundant in Peoria and Starved Rock Pools from 1964 through 1974.

The catch of goldfish generally declined in the downstream direction. From 1959 through 1974 no goldfish were taken in the Alton Pool, although carp x goldfish hybrids were taken from the Alton Pool in 1974 for the first time. Following the period of high water, 1971–1973, the number of goldfish taken from the whole river in 1973 and 1974 declined dramatically. The carp x goldfish hybrids did not exhibit such a dramatic decline. Hybrids may occur in the polluted upper river because "hybrid vigor" confers some resistance to pollution, or simply because both carp and goldfish occur there.

Carp (Table 10)

Carp (*Cyprinus carpio*) were introduced into the Illinois River in 1885. By 1898, carp brought more money to commercial fishermen along the Illinois River than all other fishes combined. The carp catch was 6–8 million pounds (2,720,000–3,630,000 kg) per year and was worth more than $200,000 (Forbes & Richardson 1920:105–106). In 1908 the catch was over 15 million pounds (6,800,000 kg), according to Thompson

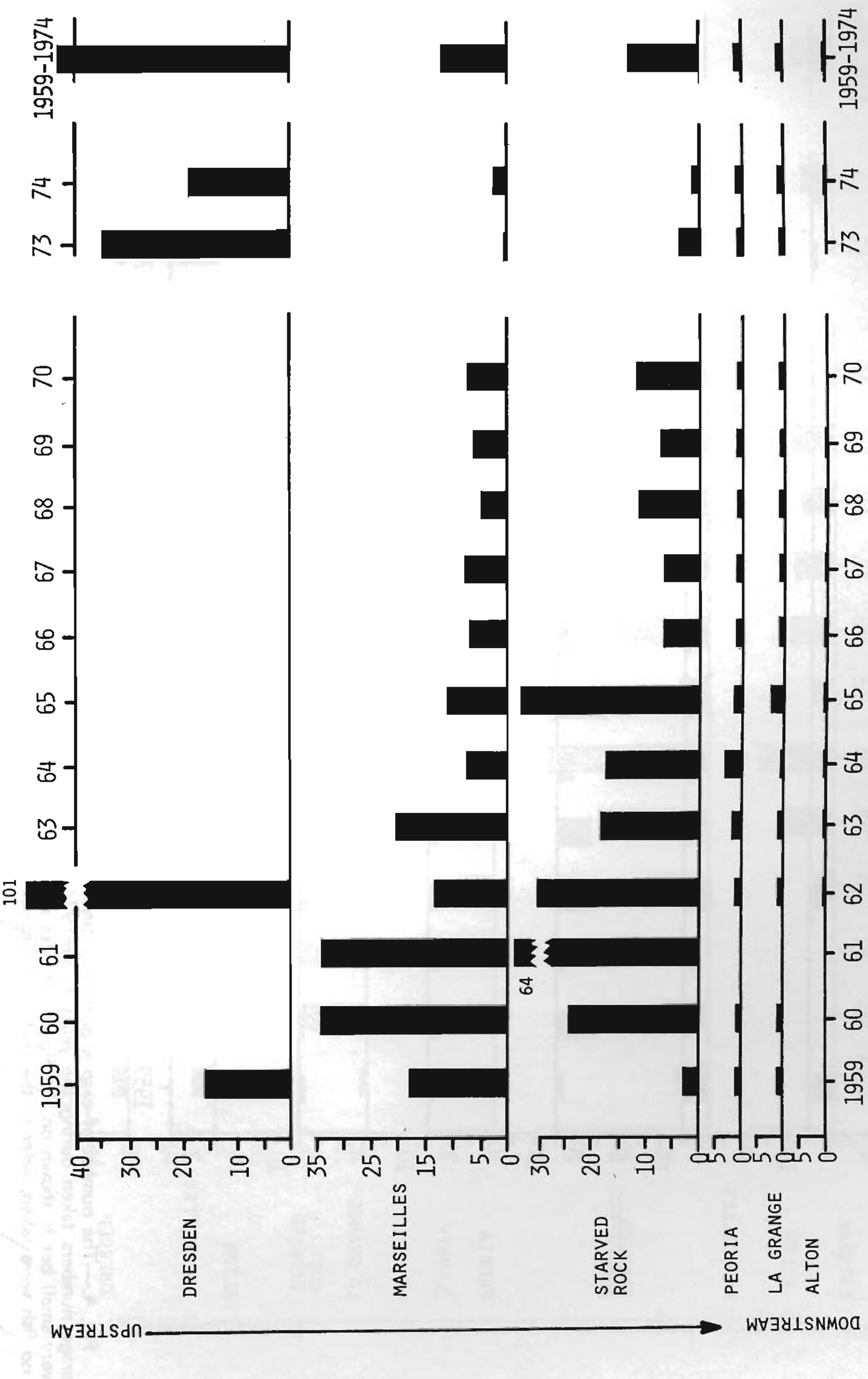


Fig. 3.—The number of goldfish taken per 30 minutes of electrofishing in the Illinois River, arranged by pool and year. The average numbers taken during the years 1959–1974 are shown in the last column. When electrofishing was conducted, but no fish were taken, a very small bar is shown on the figure. Where no electrofishing was conducted, there is no bar. To determine whether a small number of fish or no fish were taken, refer to the text or the tables.

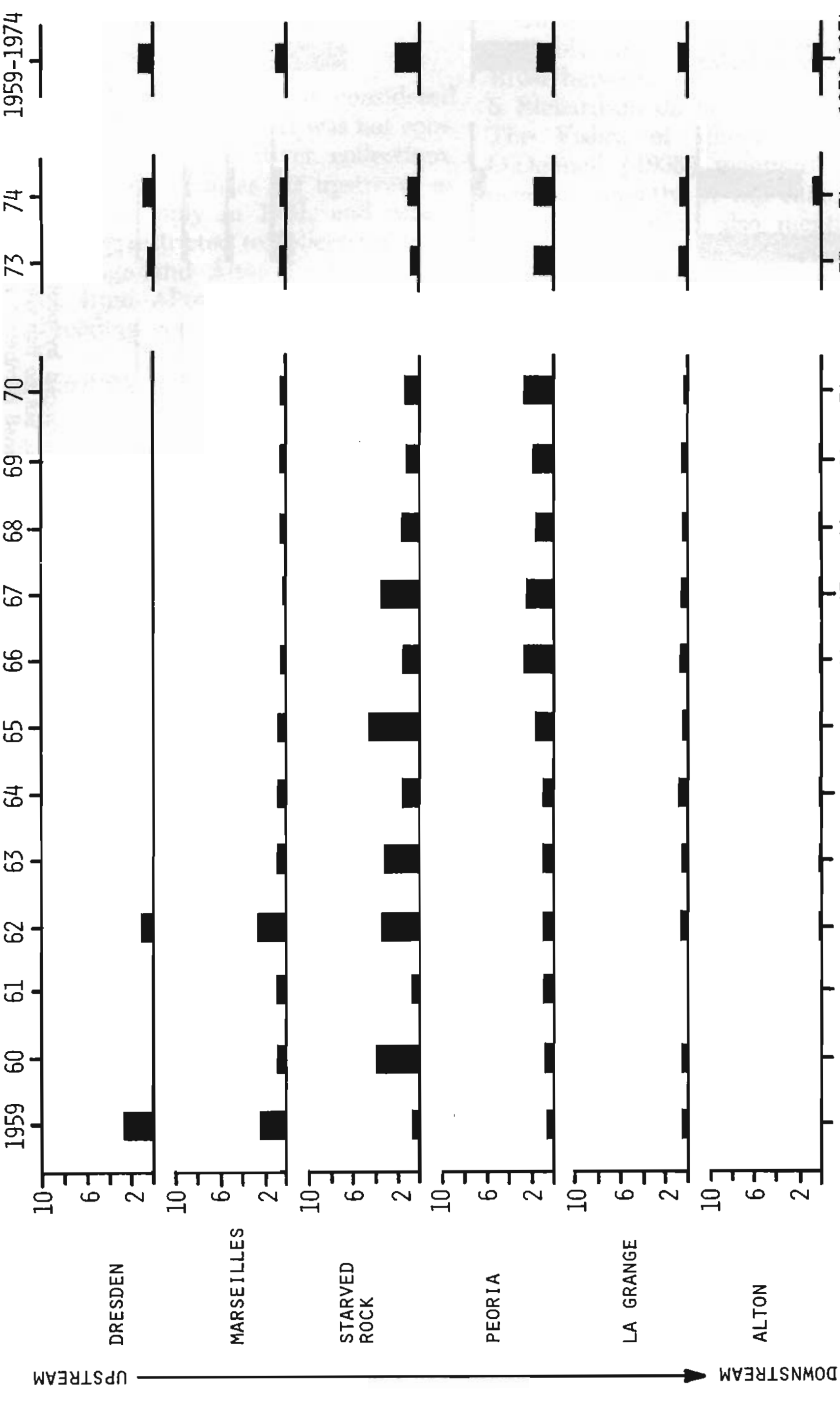


Fig. 4.—The number of carp x goldfish hybrids taken per 30 minutes of electrofishing in the Illinois River, arranged by pool and year. The average numbers taken during the years 1959–1974 are shown in the last column. When electrofishing was conducted, but no fish were taken, a very small bar is shown on the figure. Where no electrofishing was conducted, there is no bar. To determine whether a small number of fish or no fish were taken, refer to the text or the tables.

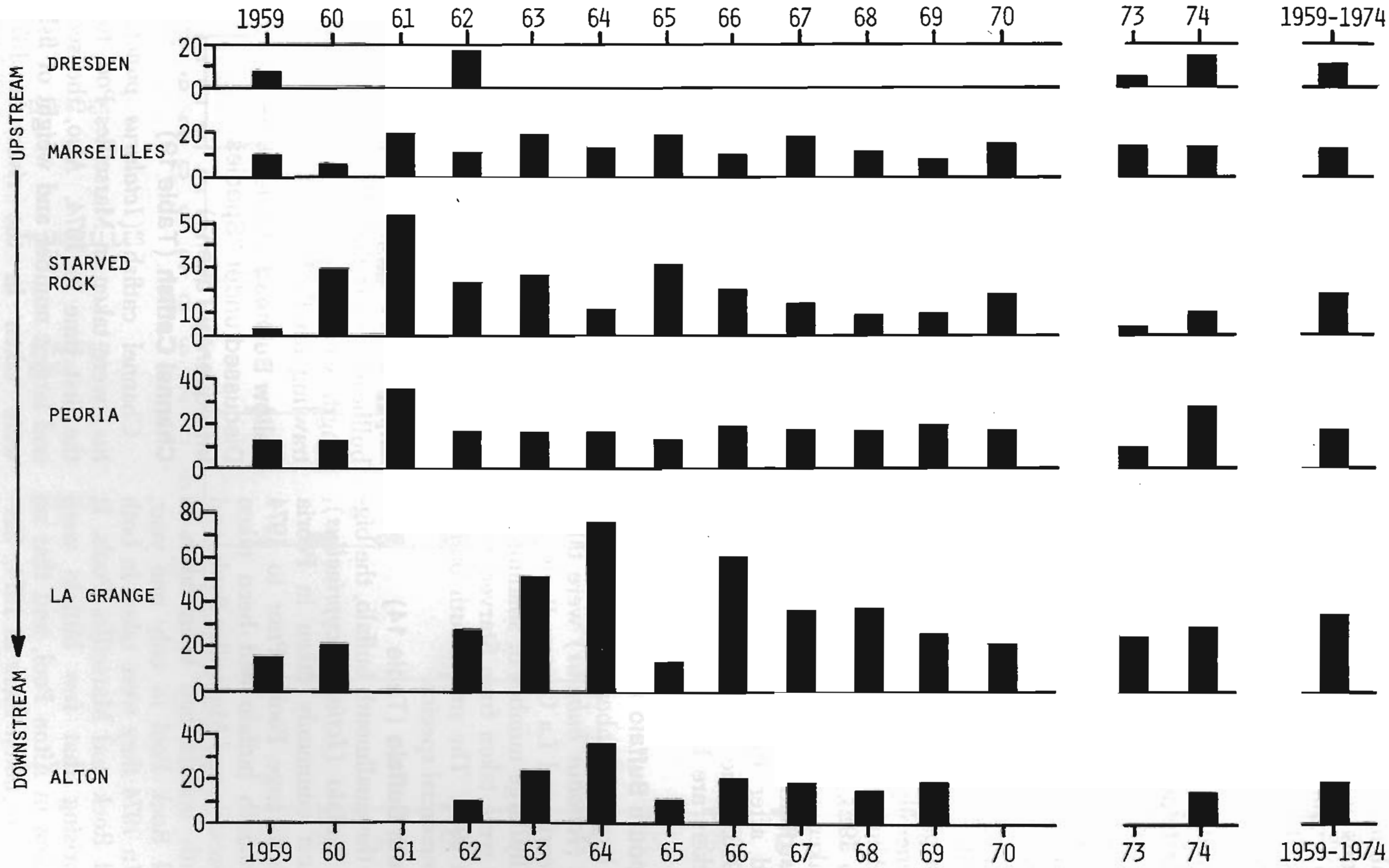


Fig. 5.—The number of carp taken per 30 minutes of electrofishing in the Illinois River, arranged by pool and year. The average numbers taken during the years 1959–1974 are shown in the last column. (Gizzard shad, like carp, were abundant throughout the river.) When electrofishing was conducted, but no fish were taken, a very small bar is shown on the figure. Where no electrofishing was conducted, there is no bar. To determine whether a small number of fish or no fish were taken, refer to the text or the tables.

(1928:285). At present, carp and gizzard shad are the only species that occur abundantly in our electrofishing collections in all pools of the river (Fig. 5). Carp and bigmouth buffalo comprise the bulk of the commercial catch in the Illinois River. The carp catch from the Illinois River was 213, 000 pounds (104,000 kg) in 1973.

River Carpsucker, Quillback Carpsucker (Tables 11 and 12)

The greatest number of quillback carpsuckers (*Carpiodes cyprinus*) was usually taken in three pools of the Illinois River: Marseilles, Starved Rock, and Peoria.

In contrast to the quillback, the most river carpsuckers (*Carpiodes carpio*) were generally taken in the three lower pools, Alton, La Grange, and Peoria, prior to 1973. In 1973 and 1974 most were taken in Starved Rock Pool, so their distribution in the river may have changed after the high-water period 1971–1973. The quillback and river carpsuckers are both commercial species.

Smallmouth Buffalo (Table 13)

The largest numbers of smallmouth buffalo (*Ictiobus bubalus*) were taken from Peoria and La Grange Pools. An unusually large number of smallmouth buffalo were taken from Starved Rock Pool in 1974. The smallmouth buffalo is a commercial species.

Bigmouth Buffalo (Table 14)

Like the smallmouth buffalo, the bigmouth buffalo (*Ictiobus cyprinellus*), was most commonly taken in Peoria and La Grange Pools. Prior to 1974 no bigmouth buffalo had been taken from Dresden and Marseilles Pools, and bigmouth buffalo had been taken in Starved Rock Pool in only one year, 1966. In 1974 they were taken in both Starved Rock and Marseilles Pools. It is surprising that few buffalo were ever taken in Alton Pool, and that no buffalo were taken there in 1974. Several commercial fishermen at Kampsville Landing and Godar Landing on the Alton Pool said that they also were catching very few bigmouth buffalo in 1974. Bigmouth buffalo rank second to carp in the commercial catch from the Illinois River.

Black Buffalo (Table 15)

The black buffalo (*Ictiobus niger*) is a commercial species. It was not abundant in the Illinois River electrofishing collections, and was taken only in the lower three pools prior to 1974. It was most commonly taken in Peoria and La Grange Pools. In 1974, the few black buffalo taken all came from Starved Rock Pool.

Shorthead Redhorse (Table 16 — Discussed under "Species Infrequently Taken")

Black Bullhead (Table 17)

The black bullhead (*Ictalurus melas*) is considered a commercial species, but most of the bullheads in our electrofishing collections were quite small.

Most of the black bullheads were taken from one station, Ballard Island Chute (river mile 247.8–248.2) in Marseilles Pool (Fig. 6), which was described earlier as being an unusually shallow, broad, marsh-fringed area, with very little current. The black bullhead probably prefers this type of habitat.

Black bullheads were collected occasionally in the main navigation channel, by means of an otter trawl. For example, on 26 August, 1964, 51 black bullheads averaging 18 cm in total length were taken in 49 minutes of trawling at mile 193.

Yellow Bullhead (Table 18 — Discussed under "Species Infrequently Taken")

Channel Catfish (Table 19)

Channel catfish (*Ictalurus punctatus*) were taken in Marseilles Pool for the first time in 1974. Also, the second largest number and weight of fish were taken in the river in 1974 (Fig. 7). Most channel catfish were taken below Beardstown (river mile

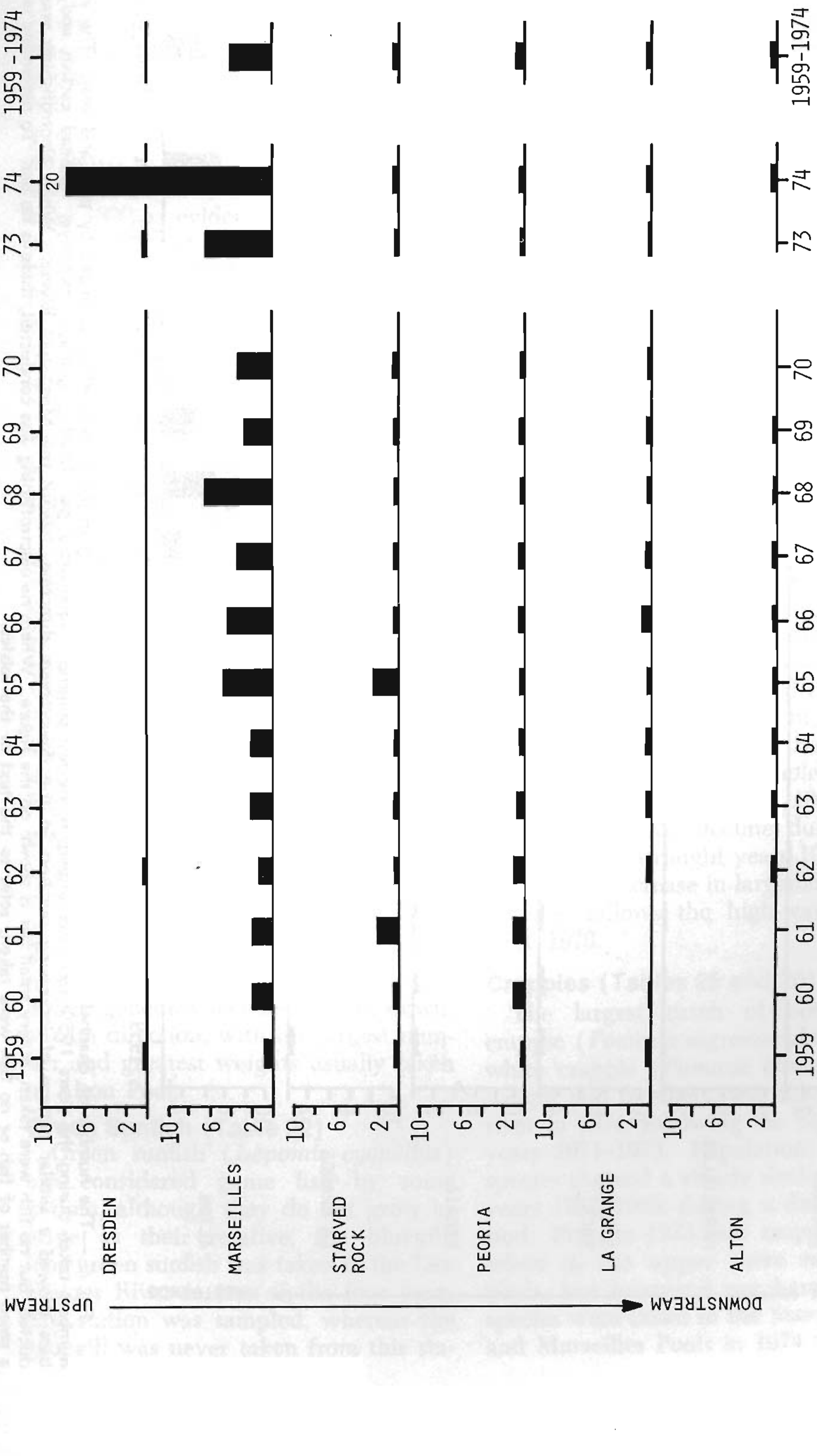


Fig. 6.—The number of black bullheads taken per 30 minutes of electrofishing in the Illinois River, arranged by pool and year. The average numbers taken during the years 1959–1974 are shown in the last column. (The black bullhead was the only species restricted primarily to one station within one pool.) When electrofishing was conducted, but no fish were taken, a very small bar is shown on the figure. Where no electrofishing was conducted, there is no bar. To determine whether a small number of fish or no fish were taken, refer to the text or the tables.

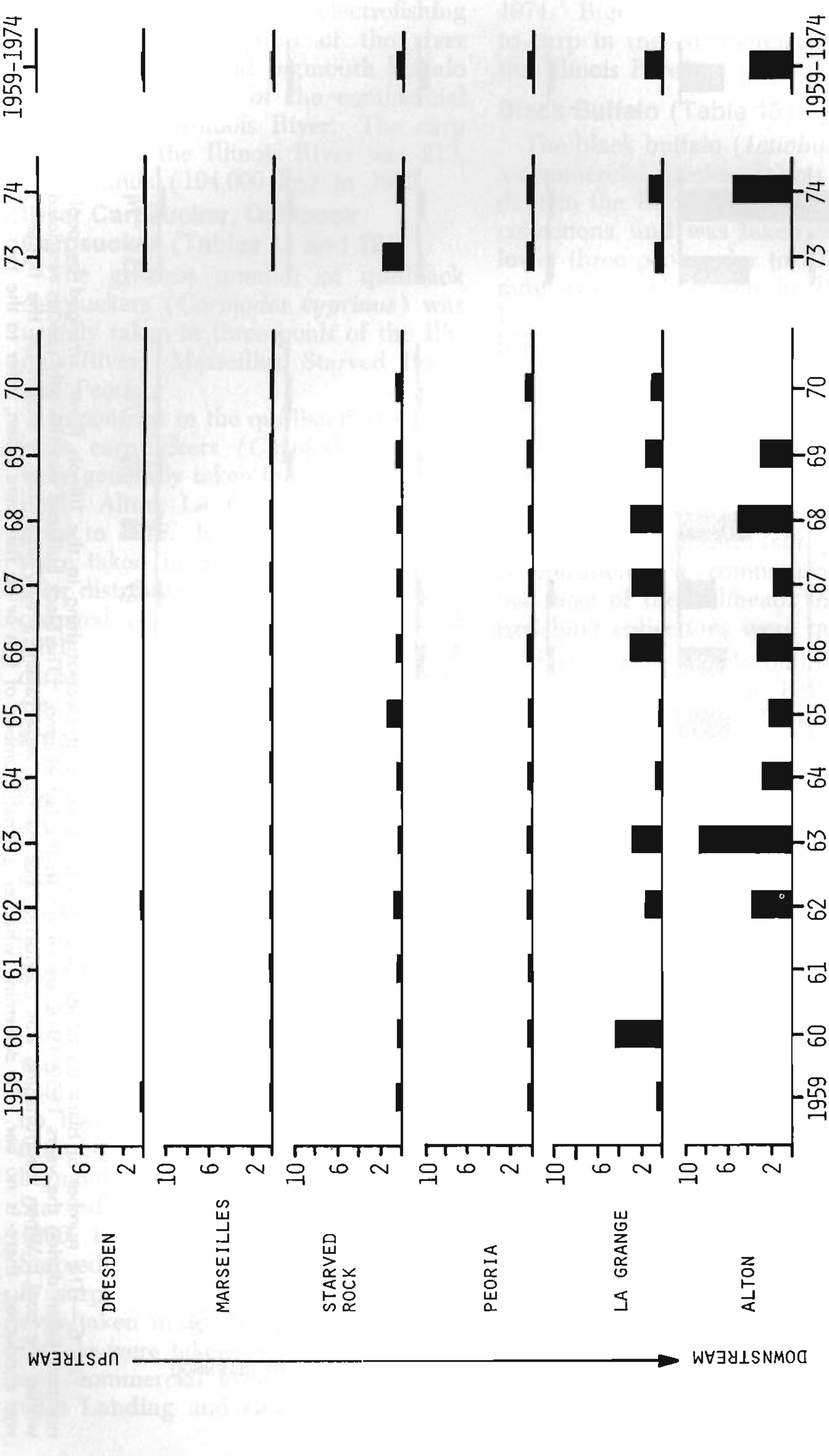


Fig. 7.—The number of channel catfish taken per 30 minutes of electrofishing in the Illinois River, arranged by pool and year. The average numbers taken during the years 1959–1974 are shown in the last column. (Shortnose gar, bowfin, goldeye, mooneye, flathead catfish and white bass showed a similar pattern of increasing numbers in the downstream direction, toward the Mississippi River.) When electrofishing was conducted, but no fish were taken, a very small bar is shown on the figure. Where no electrofishing was conducted, there is no bar. To determine whether a small number of fish or no fish were taken, refer to the text or the tables.

88.5). They were taken occasionally from the main navigation channel by trawling. On 13 November, 1964, 68 young channel catfish averaging 9 cm in total length were taken in 53 minutes of trawling in the channel at mile 156. Prior to 1973, the numbers and weights of channel catfish taken appear to be unrelated to water levels. Channel catfish have declined in the Illinois River since 1899 as evidenced by the following commercial fishing statistics: 241,000 pounds (109,316 kg) in 1899, 105,554 pounds (47,878 kg) in 1950, about 98,000 pounds (44,452 kg) in 1964 (Mills, Starrett, & Bellrose 1966:17), and 45,000 pounds (20,412 kg) in 1973. (Larry Dunham, Fishery Biologist, Illinois State Department of Conservation, personal communication.)

Flathead Catfish (Table 20)

Flathead catfish (*Pylodictis olivaris*) are a desirable commercial species and often reach weights of 9–18 kg. Flathead catfish were never abundant in the electrofishing collections, and were confined to the lower two pools. An 8.16-kg individual was taken in La Grange Pool and several 1- or 2-year-old flatheads were taken at several stations in both Alton and La Grange Pools in 1974.

White Bass (Table 21)

The white bass (*Morone chrysops*) is a game species. The largest number of white bass was taken from the river in 1974, but the greatest catch by weight was in 1968. White bass populations generally increased in the downstream direction, with the largest number and greatest weights usually taken in Alton Pool.

Green Sunfish (Table 22)

Green sunfish (*Lepomis cyanellus*) are considered game fish by some people, although they do not grow as large as their relative, the bluegill. The green sunfish was taken in the Des Plaines River in two of the four years this station was sampled, whereas the bluegill was never taken from this station. The largest numbers of green sunfish were generally taken in Peoria Pool. The number of green sunfish taken did not increase dramatically after the high-water period 1971–1973, as did the number of bluegills.

Bluegill (Table 23)

The largest number and greatest weight of bluegills (*Lepomis macrochirus*) per 30 minutes of electrofishing were taken in 1974. Bluegill populations generally increase in the downstream direction, with either Alton or La Grange Pools having the greatest number and weight. However, in only one year, 1969, were more bluegills obtained in Starved Rock Pool than in the next pool upstream.

Largemouth Bass (Table 24)

The largemouth bass (*Micropterus salmoides*) is a game species. Largemouth populations generally increase in the river in a downstream direction (Fig. 8), with the greatest numbers taken from La Grange and Peoria Pools. However, fewer bass were taken at the two stations in Starved Rock Pool than at the three stations in the next pool upstream, Marseilles. Bass populations in the river as a whole reached their peak in 1960 and 1961, then showed a drastic decline during and following the drought years 1962–1964. The recent increase in largemouth populations follows the high-water years 1971–1973.

Crappies (Tables 25 and 26)

The largest catch of both black crappie (*Pomoxis nigromaculatus*) and white crappie (*Pomoxis annularis*), in weight and numbers, was taken in the river in 1974, following the high-water years 1971–1973. Populations of both species showed a steady decline in the years 1962–1965, during a drought period. Prior to 1973, few crappies were taken in the upper three navigation pools, but increased numbers of both species were taken in the Starved Rock and Marseilles Pools in 1974. In 1962,

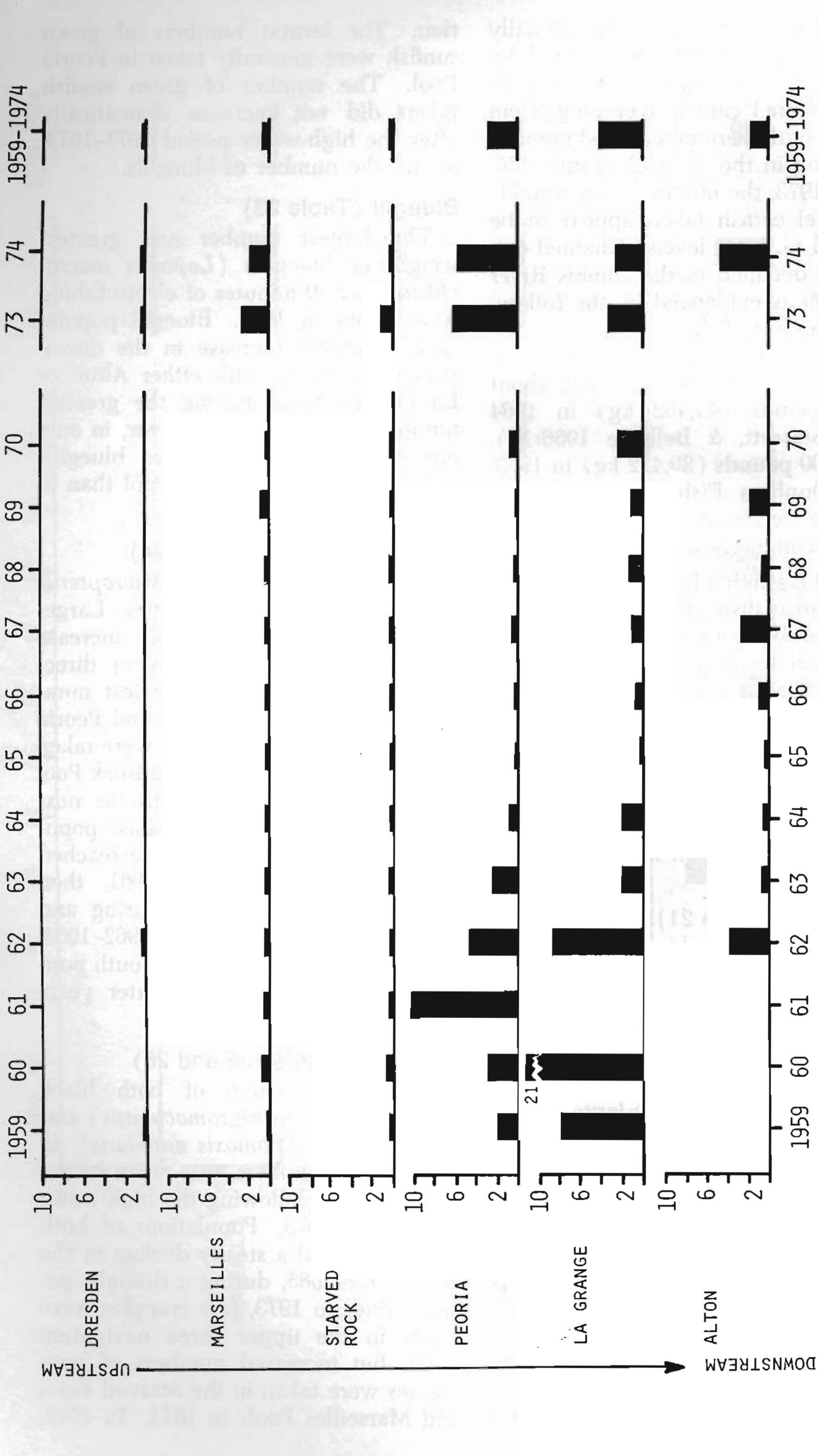


Fig. 8.—The number of largemouth bass taken per 30 minutes of electrofishing in the Illinois River, arranged by pool and year. The average numbers taken during the years 1959–1974 are shown in the last column. (The following species were also most abundant in collections from Peoria and La Grange Pools: gizzard shad, carp, river carpsucker, smallmouth buffalo, bigmouth buffalo, black buffalo, yellow bullhead, green sunfish, bluegill, white crappie, black crappie, and freshwater drum.) When electrofishing was conducted, but no fish were taken, a very small bar is shown on the figure. Where no electrofishing was conducted, there is no bar. To determine whether a small number of fish or no fish were taken, refer to the text or the tables.

1964, 1966–1969, and 1974, more black crappie were taken in La Grange Pool than in Alton Pool, perhaps because more backwater and side channel areas with brush piles (a favorite habitat of crappie) were usually available in La Grange Pool. In 1974 a larger number of small white crappie was taken in La Grange Pool than in Alton Pool but a greater weight of large white crappie was taken in Alton Pool. Both species are popular game fish.

Freshwater Drum (Table 27)

Freshwater drum (*Aplodinotus grunniens*) is a commercial species. Most were taken in La Grange Pool. The largest number of individuals and the second greatest weight were taken in 1974, following a high-water period.

Species Infrequently Taken

The yellow bullhead (*Ictalurus natalis*) (Table 18) was uncommon in our collections, and has been taken only from the three lower pools, Alton, La Grange, and Peoria.

The shorthead redhorse (*Moxostoma macrolepidotum*) (Table 16) occurred sporadically in our collections throughout the river.

A female spotted gar (*Lepisosteus oculatus*) was taken by a commercial fisherman at Havana on 26 February, 1973. Spotted gar are uncommon in the Illinois River. This specimen was the largest that had been taken in Illinois (3.41 kg, 83.8 cm in total length) and was full of ripe eggs.

Mooneye (*Hiodon tergisus*) (Table 7) were taken rarely, and only from the Alton Pool until 1974, when one was taken from upper Peoria Pool at mile 215. Goldeye (*Hiodon alosoides*) (Table 6) were taken rarely, but ranged farther upstream than their relative, the mooneye. In 1974 only two goldeye were taken, both from one station at mile 261 in Marseilles Pool.

The American eel (*Anguilla rostrata*) was rarely taken. One was taken from Alton Pool at mile 19 and two from Peoria Lake in 1974.

The white catfish (*Ictalurus catus*) is a native of brackish to fresh waters along the East Coast from Pennsylvania to Florida. It has been introduced widely in the Midwest, and several have been taken from the Illinois River by commercial fishermen at Havana, including one on 13 May, 1974. White catfish have never been taken in our electrofishing surveys.

The few smallmouth bass (*Micropterus dolomieui*) that were taken were probably introduced from tributary streams that are smaller and colder than the Illinois River.

Skipjack herring (*Alosa chrysochloris*) were taken sporadically throughout the Illinois River. Large numbers apparently moved up the river during the spring flood of 1973, and sport fishermen were catching them on minnows at Havana.

One sauger (*Stizostedion canadense*) was taken at Big Blue Island Chute (river mile 57.5–58.9) in 1974. This species was common in the river before 1908 (Forbes & Richardson 1920:275).

Orange-spotted sunfish (*Lepomis humilis*) and pumpkinseeds (*Lepomis gibbosus*) were taken sporadically.

One species, the longear sunfish (*Lepomis megalotis*), listed as being extirpated from the Illinois River and its bottomland lakes between 1908 and 1970, by W. C. Starrett and P. W. Smith (Starrett 1972:163), was taken from La Grange Pool, Turkey Island Chute (mile 147.3–148.2) on 5 September, 1973. Three adults, ranging in total length from 10.7 to 15.5 cm were taken.

Northern pike (*Esox lucius*) were taken by sport fishermen in the river below Marseilles Dam in 1973, and were netted in Lake Chautauqua in 1973 (river mile 126.0), but were not taken by electrofishing. Northern pike were common in the river before 1908 (Forbes & Richardson 1920:209).

Catfishes may be more abundant in the river than our collections indicate. They are bottom-dwelling species and when shocked they do not always come to the surface where they can be seen to be netted. Under nearly ideal conditions for electrofishing, Larimore (1961) reported taking only 10 percent of the total population of catfishes in a reach of Jordan Creek, whereas 52 percent of the sunfishes were taken. In the generally turbid waters of the lower Illinois River, a fish must be within 10–15 cm of the surface to be seen. So our collecting efficiency for catfishes must have been lower than the 10 percent obtained by Larimore in clear water.

Since we used a shocker, and 6.35 mm mesh dip nets, minnows and other small fishes were generally not taken. We did obtain emerald shiners (*Notropis atherinoides*) throughout the river in 1974 and in previous years (Mills, Starrett, & Bellrose 1966:15).

DISCUSSION

HISTORICAL CHANGES IN THE FISH POPULATIONS OF THE ILLINOIS RIVER

The Illinois-Michigan Canal along the upper Illinois River was completed in 1848, before any biological data were being collected on the Illinois River. Prior to 1871, it is unlikely that this canal had much of an impact on the middle and lower sections of the river, below Hennepin (river mile 208), which are the sections most productive of fish and wildlife. These are the most productive because the Illinois River below Hennepin follows a large valley developed in the late Pleistocene epoch, and the Illinois has developed lateral levee lakes, side channels, backwaters, and marshes which fill this ancient valley and provide excellent habitat for fish and wildlife.

In 1871, the flow of the Chicago River was reversed in order to conduct sanitary wastes from the city of Chicago away from Lake Michigan, which served as the drinking water supply for the city. The polluted waters of the Chicago River were directed through the Illinois-Michigan Canal into the Des Plaines River and thence into the Illinois River. Some of the polluted water apparently backed up into the lower reaches of the Kankakee. The effect of the polluted water on the fishes of the Kankakee and Illinois rivers was dramatic, according to a report by Nelson (1878:798):

> "Previously to the opening of the Chicago River into the canal in 1871, rock-bass, (*Ambloplites rupestris*); black-bass, (*Micropterus pallidus*) [largemouth bass, *Micropterus salmoides*]; silver bass, (*Roccus chrysops*) [white bass, *Morone chrysops*]; wall-eyed pike, (*Stizostethium vitreum*) [walleye, *Stizostedion vitreum vitreum*]; mud-pike, (?); pickerel, (*Esoxlucius*) [northern pike, *Esox lucius*]; mud-eel, (?) [lamprey?]; silver-eel, (*Anguilla rostrata*) [American eel]; buffalo fish, (*Bubalichthys bubalus*) [buffalo, *Ictiobus* ____?]; red horse, (*Myxostoma macrolepidota*) [shorthead redhorse, *Moxostoma macrolepidotum*]; suckers, *Catostomus* ____?); bull-heads, (*Amiurus catus*) [bullhead, *Ictalurus* ____?]; spoon-fish, or shovel-bill, (*Polyodon folium*) [paddlefish, *Polyodon spathula*]; sun-fish, (*Pomotis* ____?) [sunfishes, *Lepomis* ____?]; cat-fish, (*Amiurus* ____?) [catfish, *Ictalurus* ____?]; dog-fish, (*Amia calva*) [bowfin]; gar pike, (*Lepidosteus osseus*) [longnose gar, *Lepisosteus osseus*]; perch, (*Perca americana*) [yellow perch, *Perca flavescens*], were caught in both these rivers, and also in the Du Page River, which flows 6 miles east of Joliet, and empties into the Desplaines 8 miles south of that town; also in Hickory Creek which rises about 14 miles east of Joliet, and empties into the Desplaines just south of the town, and in any of the streams of sufficient size in this vicinity.

"When the current of Chicago River was first turned through the canal and the rivers, it caused the fish in them to bloat to a large size, and rising to the surface they floated down the stream in large numbers. It was estimated at the time that several tons of dead fish passed through one of the canal locks just after the foul water commenced running through the canal.

"When these bloated fish chanced to float into the clear water at the mouth of some tributary of the river they would revive and swim up the clear stream. Such large numbers of the fish revived in this manner that all the small streams flowing into the Desplaines and Kankaku [*sic*] rivers were filled with fish in such numbers that many were taken with hook and line, one man taking over 300 in a day in this manner at that time.

"When the spring freshets occur the current is so rapid and the amount of pure water in the river is so great, that the foul water does not have much effect upon the fishes, and large numbers of the species mentioned ascend the rivers and are caught with hook and line. Later in the season as the water subsides, and the water from Chicago River predominates, the fish which came up in the spring die and are floated down the river. In July and August when the water is the worst even the mud turtles leave the river in disgust and seek less odorous homes."

Water from the Illinois-Michigan Canal also entered the Illinois River at La Salle (mile 223), but the wastes were sufficiently decomposed at that point that there was only a slight impact on the ecosystem of the Illinois River below La Salle (Starrett 1972: 145).

The carp was introduced into the Illinois River in 1885, out of a stock brought to the United States a few years earlier from Europe (Forbes & Richardson 1920:105). By 1898, the carp catch exceeded the value of all other commercial fishes from the Illinois River (Thompson 1928:285). Forbes & Richardson (1920:108–109) reported fishery statistics which showed that increasing carp populations did not adversely affect the populations of other species, although they did predict that carp might displace the native buffalo fishes, which have the same food preferences as carp. Forbes & Richardson (1920: 108–110) did not feel that carp had increased the turbidity of the water in the Illinois River by their rooting habit of bottom feeding. In contrast, Jackson & Starrett (1959:163–165) observed local areas of heavy turbidity in Lake Chautauqua, a bottomland lake along the middle section of the river, produced by schools of carp. They felt that some instances of carp activity may have been stimulated by low oxygen levels. The activities of carp may have had a greater effect on turbidity in more recent times because of the presence of flocculent bottom muds that have been carried into the bottomland lakes by the river (Starrett & Fritz 1965:88).

Forbes (1928) does not mention any changes in fish fauna associated with the construction, prior to 1900, of the low navigation dams on the Illinois River at Marseilles, Henry, Copperas Creek, La Grange, and Kampsville. Nelson (1878:798) was of the opinion that a dam at Seneca (mile 252.5) hindered the upstream movement of fishes. On 1 January, 1900, the Sanitary and Ship Canal was opened at Chicago, connecting the Des Plaines and Illinois Rivers with Lake Michigan. The canal was used to flush municipal and industrial wastes into the Illinois River system, and away from Chicago's municipal water intakes in Lake Michigan. The quantity and quality of this diverted water had a tremendous impact on the Illinois

River. There was an average rise in water levels at Havana of 2.8 feet (.85 m), and during the normal low-flow period between June and September the rise was 3.6 feet (1.10 m) (Forbes & Richardson 1919:140–141). The tree line along the river retreated as a result, and the loss of mature pin oak (*Quercus palustris*) and pecan (*Carya illinoensis*) trees meant a loss of food for mallard ducks (*Anus platyrhynchos*) and wood ducks (*Aix sponsa*) (Mills, Starrett, & Bellrose 1966:5). Populations of cavity-nesting tree swallows (*Iridoprocne bicolor*) and prothonotary warblers (*Protonotaria citrea*) increased, as a result of the increased supply of nest sites in zones of dead trees bordering the river and lakes. Populations of these species declined markedly during the 1940's, as the last of the dead trees finally collapsed (Dr. Frank C. Bellrose, Waterfowl Biologist, Illinois Natural History Survey, personal communication).

One beneficial effect of the diversion was to increase the surface area of water in lakes and backwaters, which apparently improved the fishery (Forbes & Richardson 1919). It is also likely that the stumps and snags left after the trees had died temporarily provided cover for certain species such as bass, crappie, and other sunfishes. The increased shallow water areas and nutrient loading of the Illinois River and its bottomland lakes initially may have increased the plankton populations and the biomass of bottom fauna in the middle and lower river (Forbes & Richardson 1913:494–495). In the river proper, populations of molluscs, especially fingernail clams, probably increased the most, with a beneficial effect on mollusc-consuming species of adult fish such as carp, catfish, buffalo, and drum.

After approximately 1910, however, as the pollution load increased, critically low dissolved oxygen levels occurred farther and farther downstream with detrimental effects on food organisms and fish (Richardson 1921*b*: 33). Populations of molluscs, including fingernail clams (Sphaeriidae), in the middle section of the Illinois River and in several bottomland lakes were quite high in the early 1950's (Paloumpis & Starrett 1960).

In 1938, by order of the Supreme Court of the United States, the amount of water that could be diverted from Lake Michigan at Chicago was limited to a yearly average of 42.48 m^3/sec and minimum gage readings in the middle section of the river at Havana dropped about .61 m as a result (Starrett 1972:146). In spite of an increasing human population in the Illinois basin, the population equivalent of the total combined domestic and industrial waste emptied into the river declined from 6,211,471 in 1922 to 2,417,000 in 1960 (Mills, Starrett, & Bellrose 1966: 9), because more waste was receiving primary and secondary waste treatment. Population equivalents are based on the average amount of carbonaceous oxygen demand in the waste produced per person, and do not take into account the oxygen demand of the nitrogenous fraction of human waste. The demand placed on the oxygen resources of the river by nitrogenous wastes has actually increased in recent years (Butts 1975).

Minimum dissolved oxygen levels near the surface in the channel of the Illinois River during midsummer in the period 1911–1966 are reported in tables in Mills, Starrett, & Bellrose (1966:9) and Starrett (1971:370–373). In 1966, oxygen levels generally were below saturation throughout the whole length of the river. Levels below 1.0 mg/l occurred in Dresden, Peoria, and La Grange Pools. The reduction in dissolved oxygen concentration so far downstream of the Chicago and Peoria metropolitan areas results from the oxygen demand of sediment (Butts

1974) and from the oxygen demand as ammonia in municipal waste is converted to nitrate (Butts 1975). During the winter, bacterial nitrification is slowed, oxygen demand is thereby reduced, and higher ammonia concentrations extend farther downstream from Chicago (Butts 1975).

Ammonia places aquatic organisms in double jeopardy; it not only removes oxygen from water, but is also toxic. Only the un-ionized fraction of the total ammonia concentration (approximately 5 percent of the total ammonia in the Illinois River) is toxic, and the un-ionized ammonia concentrations were generally well below lethal levels for fish in 1972 and 1973, although concentrations may have been high enough on occasion in the upper river to stress fish (Lubinski et al. 1974).

It is not known to what extent the low dissolved oxygen concentrations, perhaps acting in combination with other stresses such as silt and toxic materials, contributed to the die-off of fingernail clams and snails in the middle section of the river in the mid-1950's (Mills, Starrett, & Bellrose 1966: 12). As late as 1973, fingernail clams had not reappeared in areas of the river where dead shells indicated that they were formerly abundant. The loss of these important food organisms, according to the Mills, Starrett, and Bellrose report, has resulted in a reduction of the number of diving ducks migrating along the Illinois River and a decline in the condition factor of the commercially valuable carp.

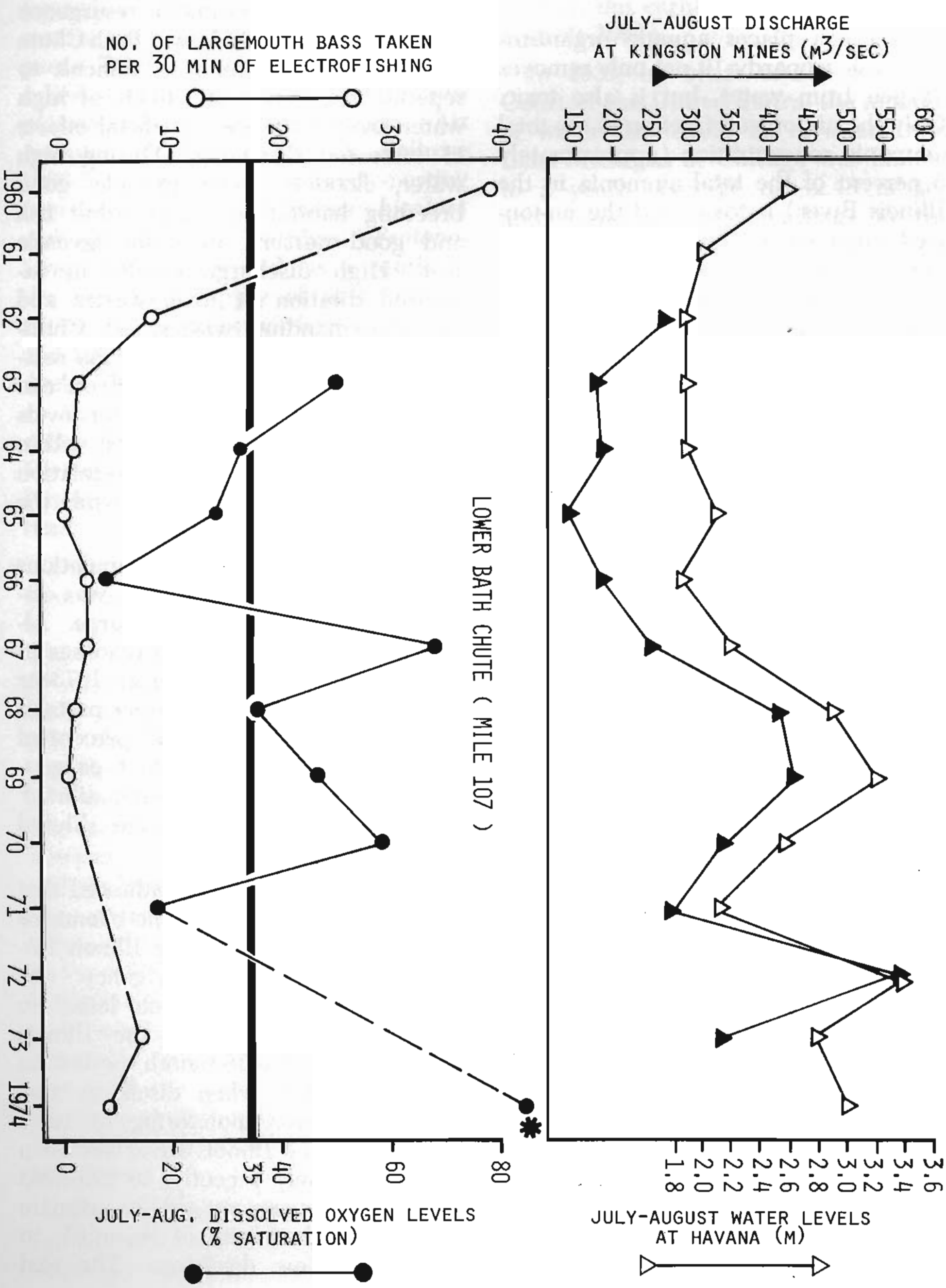
In addition to affecting the food supply of fish, low oxygen levels have direct effects on fish. Carlson & Siefert (1974) have shown that oxygen levels at 35 percent saturation reduced the survival of larval largemouth bass by 13.7 percent, and oxygen levels at 70 percent saturation and below retarded the growth of larval bass. In two areas that provide good physical conditions for largemouth bass, Lower Bath Chute, La Grange Pool (Fig. 9) and Chillicothe Island Chute, Peoria Pool (Fig. 10), midsummer oxygen levels were at 35 percent saturation or below for 4–5 years out of the 8-year period 1963–1970.

The discharge and water levels were generally high preceding the resurgence in bass populations at Lower Bath Chute (Fig. 9). Therefore, it is difficult to separate the beneficial effects of high water levels from the beneficial effects of increased discharge. During high water, flooded areas provide good breeding habitat for many adult fish and good nursery areas for juvenile fish. High discharge results in increased dilution of toxic wastes and oxygen-demanding wastes. At Chillicothe Island Chute (Fig. 10) the relative importance of the two effects can be separated, because the water levels in Peoria Pool were maintained within fairly narrow limits by flow regulation at the Peoria Lock and Dam, while the discharge varied considerably.

The resurgence in bass populations at Chillicothe Island Chute was associated with increased discharge. Although we took no oxygen readings in the chute during midsummer 1973 or 1974, oxygen readings in other parts of the river were generally 80 percent of saturation, and indicate that oxygen-demanding wastes were being diluted. Toxic wastes probably were diluted during this period also.

Lubinski et al. (1974) indicated that the combined toxicity of the chemicals routinely monitored by the Illinois Environmental Protection Agency was generally well below levels lethal to fish at 17 locations on the Illinois River during an 18-month period in 1972 and 1973, when discharge was high. Extensive monitoring of toxic materials in the Illinois River has been undertaken only recently, so Lubinski et al. (1974) were not able to estimate the combined toxicity of chemicals to fish during low discharge. The real test of whether pollution abatement programs in the Illinois Valley have resulted in improvement of water quality for fish will occur during low discharge periods in the years to come.

One of the major impacts on the Illinois River below Hennepin was the leveeing and draining of bottomland areas, primarily in the period 1903–1926. Of 400,000 bottomland acres (161,874 ha) subject to overflow by the river, approximately 200,000



acres (80,937 ha) are now behind levees (Mills, Starrett, & Bellrose 1966: 5), with a consequent reduction in wildlife and fish habitat. The backwaters and bottomland lakes of the Illinois River were, and are, critically important to fish and wildlife production.

Richardson (1921*a*:464) reported that the largest weights of fish per acre were taken in reaches of the river with the largest connecting lake area:

> "Taking the year 1908 as an illustration, and using the figures for separate shipping points obtained by the Illinois Fish Commission in that year, we find for the 59.3 miles of river and lakes between Copperas Creek dam (river mile 136.9) and La Grange dam (river mile 77.6), with about 90% of its acreage consisting of lakes and ponds, an average fish-yield per acre for water levels prevailing half the year, of 178.4 pounds; for the 87 miles from La Salle (river mile 223.9) to Copperas Creek dam, with about 83% lakes, 130.4 pounds; and for the lower 77 miles, La Grange to Grafton, with around 63% lakes, only 69.8 pounds."

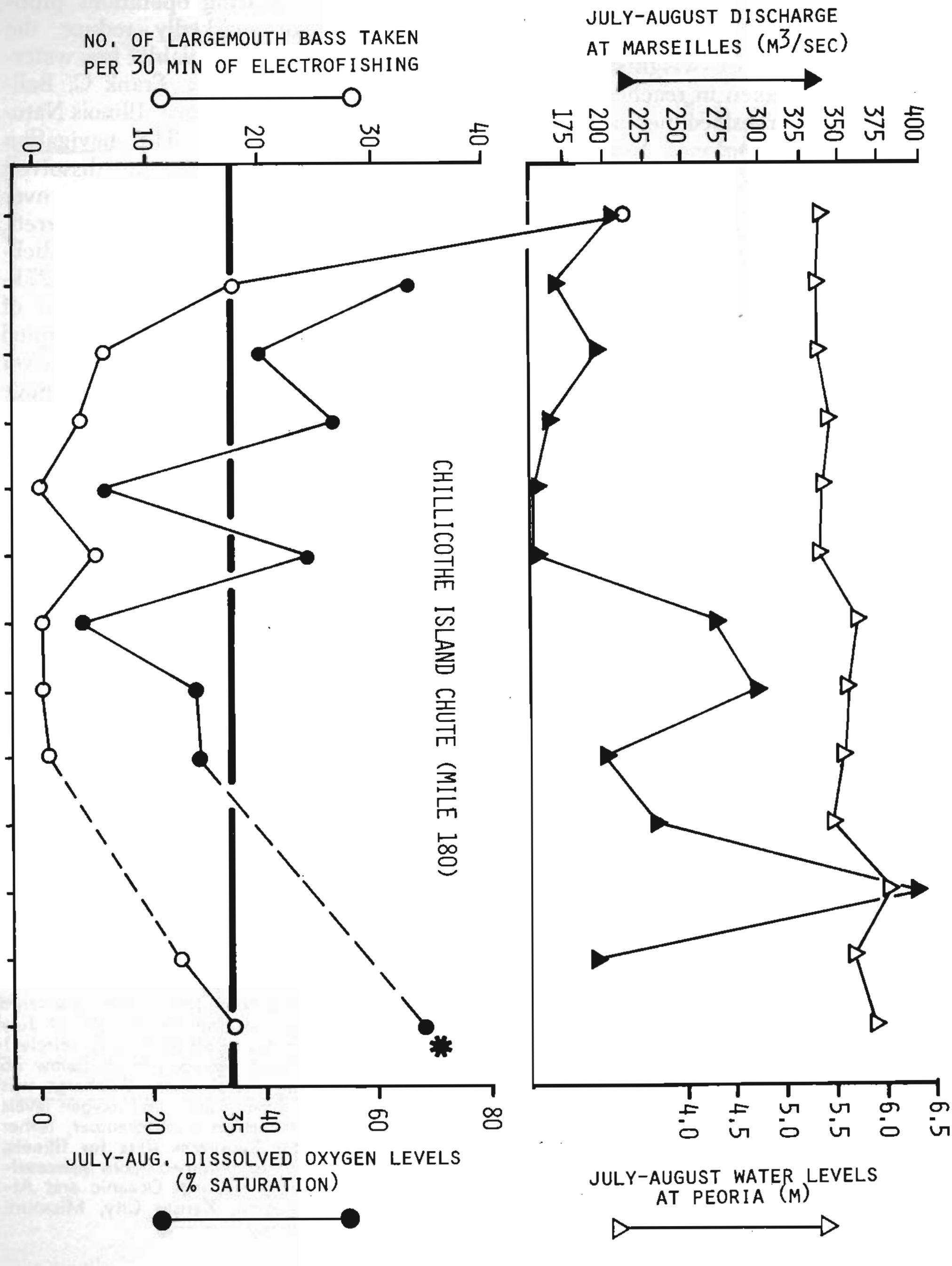
Richardson (1921*a*:463) indicates that well over 80 percent of the total fish yield in 1908 came from the lakes, with much less than 20 percent coming from the river itself. The bottomland lakes supported an abundant aquatic weed-inhabiting invertebrate fauna, which supplied food for young fishes of the sunfish, perch, and pike families.

In the 1930's high navigation dams were constructed at Dresden Heights (6.71 m high), Marseilles (7.32 m), Starved Rock (5.79 m), Peoria (3.35 m), and La Grange (3.05 m). The navigation dam at Alton on the Mississippi raised water levels in the Illinois as far north as Hardin, at river mile 21.0. Timber and brush were cleared from areas due to be inundated by the new dams. Clearing operations probably did not markedly reduce the amount of mast available for waterfowl, according to Dr. Frank C. Bellrose, Waterfowl Biologist, Illinois Natural History Survey. The navigation dams temporarily increase dissolved oxygen levels as the water passes over and through the dams (Mills, Starrett, & Bellrose 1966:9–10; Forbes & Richardson 1913:549). Starrett (1971:271–272) indicated that the reduction of diversion from Lake Michigan coupled with the higher dams on the river have resulted in a decrease of average current velocity from about 2.01–4.02 km/hour prior to 1908 to 0.97 km/hour in 1966. Pools behind navigation dams on the upper river have filled with oxygen-demanding sediment which in places resembles sludge from secondary sewage treatment plants (Butts 1974).

Richardson (1921*a*:457, 474–475) indicated that abundant populations of fingernail clams in the Illinois River were generally found in areas of reduced current and favorable conditions for sedimentation. We (and others, such as Gale 1969) have found that abundant populations of fingernail clams occur in Pool 19 on the Mississippi River, over soft mud bottoms, and Gale (1971) reported that fingernail clams will select mud substrates in preference to sandy mud and sand.

Fig. 9.—The relationships among mean water levels (open triangles), mean discharge (black triangles), and mean dissolved oxygen levels (black dots) during the months of July and August and the number of largemouth bass taken per 30 minutes of electrofishing (circles) in the fall at Lower Bath Chute (mile 107) in the La Grange Pool. Oxygen levels below 35 percent saturation (heavy line) reduce the survival of larval largemouth bass. Discharge was measured at Kingston Mines (mile 145), water levels at Havana (mile 120), and oxygen levels in the chute. The oxygen reading marked by an asterisk was taken on 12 September, rather than in midsummer. Discharge rates were obtained from **Water Resources Data for Illinois,** U.S. Dept. of the Interior, Geological Survey. Water levels were obtained from **Missouri-Mississippi River Summary & Forecasts,** U.S. Dept. of Commerce, National Oceanic and Atmospheric Administration, National Weather Service Central Region, Kansas City, Missouri. The other data were obtained by the Illinois Natural History Survey.

If the high navigation dams constructed in the 1930's did reduce the current and increase sedimentation in parts of the Illinois River, then the habitat suitable for fingernail clams may have increased, with a benefit to the mollusc-eating fish. It is puzzling that conditions have been so dramatically different since 1955, when a die-off of fingernail clams occurred in the middle section of the Illinois River (Mills, Starrett, & Bellrose 1966:12). As late as



1973, the fingernail clams had not returned to areas of the river where dead shells indicated they had formerly been abundant.

Starrett (1971:272) felt that the increase in sluggishness of the river and the increased planting of row crops in the Illinois basin have made siltation in the last 30 years an important factor adversely affecting the survival of mussels and other organisms in the Illinois River and its bottomland lakes. Silt physically removes habitat by filling in areas such as Lake Chautauqua, near Havana (river mile 124–130), which has lost 18.3 percent of its storage capacity in a period of 23.8 years (Stall & Melsted 1951:1). Areas in Quiver Lake near Havana where boats could formerly be launched are now only a few centimeters deep in low water stages, and willows are encroaching on the lake. Jackson & Starrett (1959:160) stated:

> "The sediments in Lake Chautauqua are mostly of a fine texture and form a loose, flocculent 'false bottom' (not similar to the type found in bog lakes) over the original lake bottom. A slight disturbance of the 'false bottom' causes particles to become resuspended and so increases the turbidity of the water."

The same authors found that an increase in wind velocity from light to strong increased the turbidity from 162 to 700 Jackson turbidimeter units (JTU) and that it took a calm period of 7–12 days for much of this sediment to settle from Lake Chautauqua. As a consequence, this lake and other bottomland lakes are highly turbid most of the time.

The turbidity levels in bottomland lakes and backwaters along the Illinois River are within the range that reduces fish production. Buck (1956) studied fish production in farm ponds, hatchery ponds, and reservoirs in Oklahoma which had a wide range of turbidities. The farm ponds were treated with rotenone, then restocked with largemouth bass and bluegills or largemouth bass and redear sunfish (*Lepomis microlophus*). Twelve farm ponds were divided into three turbidity classes. After two growing seasons, the average total weights of fish were:

Clear ponds
(less than 25 JTU)—161.5 lb/acre
(181.0 kg/ha)

Intermediate ponds
(25–100 JTU)—94.0 lb/acre
(105.4 kg/ha)

Muddy ponds
(>100 JTU)—29.3 lb/acre
(32.8 kg/ha)

The decline in production in turbid ponds resulted from a decline in both reproduction and growth (Buck 1956).

The results from hatchery ponds, where turbidities were artificially controlled, and from the reservoirs which harbored a variety of fishes, generally paralleled the results from the farm ponds, except for two species, channel catfish and flathead catfish.

Channel catfish spawn in dark cavities, such as hollow logs or in holes in banks. Turbid waters are likely to have more suitably dark cavities per surface area or length of shoreline than do clear waters, and thus reproduction of channel catfish was probably greater in the turbid waters. Flathead catfish grow well in turbid waters and appear to be well adapted to turbid conditions.

Fig. 10.—The relationships among mean water levels (symbols are the same as in Fig. 9), mean discharge, and mean dissolved oxygen levels during the months of July and August and the number of largemouth bass taken per 30 minutes of electrofishing in the fall at Chillicothe Island Chute (mile 180) on the Illinois River. Oxygen levels below 35 percent saturation (heavy line) reduce the survival of larval largemouth bass. Chillicothe Island Chute is in the Peoria Pool. Discharge was measured at Marseilles (mile 247), water levels at Peoria (mile 163), and oxygen levels in the chute. The oxygen reading marked by an asterisk was taken on 30 September, rather than in midsummer. Data were obtained from the same sources as given for Fig. 9.

Buck (1956:257) concludes that in newly formed reservoirs bass, crappies, and other scaled fish out-produce catfish and then limit them by predation on the young. Turbid waters offer catfish protection from these predators. In addition, sunfishes prefer to construct nests on firm substrates, rather than mud. Their eggs and fry are probably more susceptible to smothering by sediment than those of catfish and rough fish.

The disappearance of the yellow perch (*Perca flavescens*) from the Illinois River and its bottomland lakes is probably also associated with the disappearance of the plant beds and clean sandy or pebbly bottoms the perch uses for spawning.

Catfish feed on the types of food organisms which can grow in turbid waters with mud bottoms, such as midges, worms, fingernail clams, and snails. Catfish can use their highly developed sense of smell to locate food, whereas other game fish rely more heavily on sight. Food habits studies have shown that young game fish feed first on zooplankton, then on insects such as dragonfly and damselfly nymphs, then on larger organisms such as fishes and crayfishes. These types of food organisms are associated with weed beds and moderately clear water. The bottomland lakes along the Illinois River have been transformed from the latter type of ecosystem to a turbid type of system, by the influx of sediment from the river.

Recently, even the fish and duck food organisms which are adapted to mud bottoms have died out in the channel and lateral areas of the middle section of the Illinois. Fingernail clams in this section died out in 1955, and have not since recolonized the area. It is possible that some of the heavier benthic animals such as the molluscs find it difficult to remain near the top of the flocculent bottoms or that the suspended material interferes with their feeding activities. The senior author suspects that the sediments exert an oxygen demand in the lakes, just as they do in the river. In August, 1974 dissolved oxygen levels in Meredosia Lake (river mile 72–77) were approximately 3 mg/l when a strong wind was blowing that stirred bottom sediments in the shallow lake. A die-off of gizzard shad was occurring, and almost all the fingernail clams maintained in plastic cages on the bottom of the lake had died since they were last checked in mid-July. Oxygen levels may have been lower than 3 mg/l on previous occasions. Oxygen levels in the river on the same date were approximately 6 mg/l. It is also possible that toxic materials, such as pesticides, that are bound to soil particles, were taken up by aquatic organisms such as clams that ingested the soil particles or passed them over their respiratory membranes. In addition, toxicants such as hydrogen sulfide may have been formed and released from bottom muds under anaerobic conditions.

The increased barge traffic (Starrett 1972:153) associated with the improved navigation channel increases the turbidity of the river. The turbulence produced in midchannel, as well as the washing action along shore, resuspends sediment, thereby increasing the turbidity (Fig. 1 and 2). W. C. Starrett made numerous observations of the effect of barges on turbidity of the river, for example (Starrett 1971:273):

> "A towboat underway causes a strong current and washing action on the silt bottom ("false bottom") inshore, which resuspends the silt particles, thereby increasing the turbidity. The increase in turbidity is more noticeable in the lower three pools, particularly in the Alton Pool, than it is upstream because of differences in bottom types. . . . The outrush of water from shore toward the channel caused by a towboat also temporarily exposes the shallow areas. On November 18, 1964, in the Alton Pool at river mile 65.1,

the turbidity just prior to the passing of two towboats was 108 units (Jackson turbidity units), and within 6 minutes after the tows had passed, the turbidity was 320 units. Sixteen minutes later the turbidity had dropped to 240 units."

Some personal observations were made on the effects of towboats during the 1974 electrofishing investigations. On several occasions, flow reversals in chutes were observed as tows passed first one end, then the other, of a chute. In a narrow part of the river channel above Pekin on 19 September, 1974, in the midst of electrofishing, our boat was stranded on the mud when the water rushed out from shore as a tow of nine fully loaded coal barges passed upstream. Mussel shells were clearly visible on the bottom for several seconds before the water rushed back again. We had been in approximately 0.5 m of water.

Such washing along the shore and flow reversals in side channels may have a detrimental effect on benthic organisms and fishes that make nests in shallow water, such as sunfishes.

Low flows from 1962 to 1964, and consequent low oxygen levels and reduced dilution of toxic wastes, apparently are responsible for the decline during the same period of game species such as largemouth bass, crappies, and bluegill. Catches of these species showed dramatic recoveries following the high-water period 1971–1973. In 14 years of electrofishing, covering the period 1959–1974, the largest numbers of the following species were obtained in 1974, following the high water period: black crappie, white crappie, flathead catfish, white bass, bluegill, bigmouth buffalo, and black buffalo. The maximum weights of the following species were obtained in 1974: white crappie, channel catfish, and bluegill. Fig. 8, 9, and 10 show that bass populations still had not recovered to the peak levels observed in Peoria and La Grange Pools in the years 1959–1962.

High water levels stimulate certain species, such as white bass, to run up tributary streams and spawn. White bass were obtained in the upstream pools, Starved Rock and Marseilles, in fairly substantial numbers in 1973 and 1974, whereas none were obtained in these pools in 1959, 1961, 1963, 1964, 1968, and 1969. High water also increases the space available for spawning activities of fishes that build nests in shallow water, such as sunfishes, and the amount of protected habitat available for juvenile fish, in shallow, flooded areas and around brush and tree stumps. As mentioned above, higher oxygen levels have occurred in the Illinois River in association with the high flows, with beneficial effects on fish and fish food organisms.

In spite of the improvement in the electrofishing catch in 1973 and 1974, apparently due to high water levels in 1971–1973, the commercial catch of fish in the Illinois River continued its historical decline in the 1970's (Table 28). Depending on whether the Illinois Department of Conservation figures or the National Marine Fisheries Service statistics are used, the catch dipped under 1 million pounds (454,000 kg) in 1971 or 1972. The decline is not explained by a reduction in the number of commercial fishermen—there were 13 full time and 56 part time Illinois River commercial fishermen in 1973, and 9 full time and 47 part time in 1971. Nor is it explained by a decline in economic value of the catch. The catch from the Mississippi River bordering Illinois has been relatively constant from 1950 through 1973 (Table 28). A general decline in profits would be reflected in a general decline in fishing effort in both the Illinois and Mississippi Rivers and a corresponding decline in catch. It is possible that because fishermen generally take large adult fish, an increase in the catch of commercially important sizes of fish will not be seen until the fish spawned in 1973 and 1974 reach marketable size.

FUTURE IMPACTS ON THE FISH POPULATIONS OF THE ILLINOIS RIVER

In 1971 the Chicago Metropolitan Sanitary District began a large-scale sludge recycling project near the Illinois River at St. David. In 1974, the District began aerating a section of the Chicago Sanitary and Ship Canal, and more of the canal will be aerated in succeeding years. In the future, all Chicago storm water probably will be captured and stored in a deep tunnel under Chicago, instead of being discharged into the canal, and will be treated before it is released to the canal. Advanced waste treatment plants should be capable of removing the ammonia that now exerts an oxygen demand so far down river. All of these improvements in waste treatment will have a beneficial impact on the aquatic life in the river, by reducing the oxygen demand on the river and improving oxygen levels during critical low-flow periods. Waste treatment probably will also be improved in the Pekin-Peoria metropolitan area.

A proposed increase in the depth of the navigation channel of the Illinois River (from 2.7 to 3.7 m), would be accomplished by a combination of raising low-flow water levels and dredging. Depending on local topography, the water surface area might be increased. Judging by the increased fishery in the Illinois River following a rise in water levels in 1900, as a result of water diversion from Lake Michigan, one might expect a beneficial effect. However, bottomland lakes that now have a chance to clear during periods when they are cut off from the river might then become permanently connected to the river and receive a continuous, rather than intermittent, input of oxygen-demanding sediment. In 1921, Richardson (1921*a*:418) reported that Quiver Lake (mile 121.0–mile 124.0) and Matanzas Lake (mile 114.5–117.0) received spring water from the sandy bluffs on the east side, and that the waters in these lakes were somewhat clearer than in other bottomland lakes. According to an Illinois Water Survey report (Singh & Stall 1973:19), the influx of ground water to the river from Kingston Mines (mile 145.3) to Meredosia (mile 71.1) amounts to 8.75 m^3/sec, or about one-twelfth of the total input to this section of the river, during the lowest flow expected for a 7-day period at a recurrence interval of 10 years. According to Matanzas Beach residents, the water and shoreline of Lake Matanzas still are cleared of silt deposited by the river, due to the flushing action of ground water coming through the sandy bottom along the bluff. In contrast, Quiver Lake is now filled with silt.

The Illinois Department of Conservation has been able to restore aquatic vegetation to Rice Lake (mile 133–137) and Stump Lake (approximately mile 5) by pumping water out of the lakes or allowing them to dry out naturally (personal communication, Robert L. Glesenkamp, Area Wildlife Manager, Illinois Department of Conservation). Midsummer drying was a natural occurrence in this type of shallow lake, during low-flow years, prior to Lake Michigan diversion and construction of navigation dams (Richardson 1921*a*: 419). On drying, the bottom muds were compacted, and when the lakes were reflooded, the turbid water generally cleared, and the plants gained roothold in the firm bottom. Restoration efforts would be more difficult if summer water levels were higher. In addition, private duck clubs and state and federal wildlife refuges along the river would find it difficult to reduce water levels. They attempt to reduce water levels to expose mud flats and encourage the growth of moist-soil food plants for waterfowl. Once again, a natural drying cycle has had to be replaced or supplemented by pumping, because water levels do not attain the low levels they once did. Such management techniques require energy, equipment, and manpower.

Larger towboats using the improved navigation channel and an increased number of towboats would keep more silt in suspension and increase the washing action along the shore and flow reversals in chutes. Fig. 1 shows that if towboats pass a point in the river more frequently than once every 2½ hours, the resuspended sediment will not have a chance to settle out and the average amount of sediment suspended in the water will increase with a consequent increase in oxygen demand and turbidity. The more silt there is in suspension in the river, the faster bottomland lakes such as Lake Chautauqua (mile 124–130) will fill with oxygen-demanding sediment, as they are periodically overflowed by the river.

The effect of various future channel improvement schemes and various levels of boat traffic on the siltation rate in the critical backwater areas and lakes needs to be predicted. In addition, the joint effects of man's activities in the river and drainage basin needs to be assessed. For example, it is possible that the proposed increase in diversion of Lake Michigan water at Chicago (discussed in more detail below) may make it possible for the present channel to accommodate deeper-draft barges in certain areas, without additional dredging or higher dams.

It would be counter-productive for one arm of government to spend resources in improving and restoring refuge areas if another arm of government engages in practices which degrade such areas. There will be little benefit to the fisheries of the Illinois River by having the Chicago Metropolitan Sanitary District and other municipalities and industries expend billions of dollars in improved waste treatment if the river and its bottomland lakes are increasingly degraded by silt. Refuges, unpolluted lakes, and unpolluted tributary streams must be maintained if the river is to show the recovery pattern in the future that it exhibited in 1973–1974, following the high-water period and improved oxygen levels from 1971–1973. When formerly degraded areas are restored, they can be recolonized rapidly by species that are desirable to man, if reservoirs of such species, and reservoirs of food organisms for desirable species, are available in undegraded pockets in the ecosystem. In a properly functioning system, the refuges maintained by man have precisely this function.

The most practicable solution to the silt problem may be to reduce the amount entering the river in the first place, if predictive studies indicate that a reduction of silt input would actually reduce siltation in the lakes and backwaters. Once the silt is in the river and lakes, it may be recycled and resuspended there, and it is possible that no reduction in turbidity or oxygen demand would be achieved by reduction of silt input without the use of restoration techniques, such as drying out of lakes. On the other hand, it is possible that reduced silt input may cause the river to flush out backwater areas and lakes during periods of high flow, thus bringing about a natural restoration of these areas. Once the turbidity was reduced, fringing marshes and beds of aquatic plants might appear again, further accelerating restoration by acting as silt filters and nutrient traps.

The silt entering the river could be reduced by wide adoption of soil conservation practices in the Illinois basin, including such new practices as no-till farming, where row crops are planted without greatly disturbing the soil. Before the latter practice is adopted on a wide scale, the total energy requirements (including the energy for the manufacture of agricultural chemicals) of various alternative farming methods need to be determined, and the environmental impact of the herbicides that must be used with present no-till farming methods needs to be assessed.

The City of Chicago and lakefront residents whose property has been damaged as a result of current high water levels in Lake Michigan have requested an increased diversion of Lake Michigan water into the Illinois River. An increased diversion would probably raise water levels, with some of the detrimental effects discussed above. However, Lake Michigan water is good quality water and probably would improve the quality of the upper river by a simple dilution, if diversion occurred during the summer months. On the other hand, if ammonia removal is not achieved by the Chicago Metropolitan Sanitary District, the effect of increased diversion might be to push this oxygen-demanding waste farther downstream before its oxygen demand could be satisfied.

Two introduced species have entered the Illinois River recently and will probably become more abundant, just as the introduced carp, goldfish, and white catfish have. It is difficult to predict whether the latest arrivals will increase explosively, as carp and goldfish did, or whether they will barely maintain themselves, as white catfish have. White catfish are only occasionally taken from the Illinois River and do not seem to reproduce abundantly in the river. The white amur (*Ctenopharyngodon idella*), a plant-eating fish introduced from Asia, is now being taken regularly by commercial fishermen from the Mississippi River at Crystal City, Missouri and from the Missouri River (Personal communications, William L. Pflieger, Fishery Biologist, Missouri Department of Conservation, and Peter Paladino, District Fishery Biologist, Illinois Department of Conservation), and has probably entered the lower Illinois River. If rooted aquatic vegetation could be restored to the Illinois River and its bottomland lakes by the lake restoration techniques discussed above, or by a reduction of silt loads in the river as a result of improved soil conservation practices in the basin, the white amur might have a detrimental impact. On the other hand, white amur from the Mississippi are being marketed in small quantities commercially and their flavor is reported to be excellent. White amur in the Mississippi grow to a large size (4.5–6.4 kg) in 2 years (Personal communications, Pflieger and Paladino). They might become a useful commercial species in the Illinois River.

Another exotic species, the Asiatic clam (*Corbicula manilensis*) was found at three locations on the Illinois in the course of the 1974 electrofishing survey: at Kampsville (river mile 32.0), Bath Chute (mile 106.7), and Turkey Island Chute (mile 148.4) (Thompson & Sparks, in press). The Asiatic clam is a serious nuisance, because it has blocked condenser tubes of power plants in Illinois and elsewhere. In addition, it may displace the native fingernail clams.

The future of the Illinois River will largely be determined by man's activities in the river and adjacent floodplain and by his use of the land in the drainage basin. Predictions of the impacts of various activities must be developed, so a rational management scheme for the Illinois River can be designed and the river can continue to serve a variety of purposes in the future.

SUMMARY

1. The upper Illinois River is warmer than the lower River, as a result of warm municipal and industrial effluents.

2. The upper river is less turbid, because the bottom is generally rocky, whereas Peoria, La Grange, and Alton Pools contain flocculent muds that have entered the river and are kept in suspension by the river current and by

wave action resulting from wind, towboats, and pleasurecraft.

3. Dissolved oxygen levels at the surface and the bottom of the river were virtually the same in the fall of 1974, and dissolved oxygen levels were 77–97 percent of saturation in Alton Pool, 65–122 percent of saturation in La Grange and Peoria Pools, and 47–104 percent of saturation in the upper Pools of Starved Rock, Marseilles, and Dresden. Local areas of super-saturation occurred where plankton blooms appeared to be in progress. In two areas that provided good physical habitat for largemouth bass, Lower Bath Chute, La Grange Pool (mile 107) and Chillicothe Island Chute, Peoria Pool (mile 180), midsummer oxygen levels were at 35 percent saturation or below for 4–5 years out of the 8-year period 1963–1970. Laboratory experiments have shown that oxygen levels below 35 percent saturation reduce the survival of larval largemouth bass and levels below 70 percent retard their growth.

4. The number of fish species taken by electrofishing in the Dresden Pool, Des Plaines River portion of the Illinois Waterway during the period 1959–1974 was consistently low (Tables 29 and 30). Only carp and goldfish and hybrids of these two pollution-tolerant species were commonly taken.

5. The following species showed a trend of increasing abundance in the downstream direction, away from Chicago, with the largest number occurring in Alton Pool: shortnose gar, bowfin, goldeye, mooneye, channel catfish, flathead catfish, and white bass.

6. Goldfish showed a trend of increasing abundance in the upstream direction, toward Chicago.

7. The following species were most abundant in one or both of the two middle pools of the river, La Grange and Peoria Pools, which have the most connecting lake area: gizzard shad, carp, river carpsucker, smallmouth buffalo, bigmouth buffalo, black buffalo, yellow bullhead, green sunfish, bluegill, largemouth bass, white crappie, black crappie, and freshwater drum.

8. Gizzard shad and carp were generally abundant throughout the river.

9. Black bullheads were abundant at one atypical station, Ballard Island Chute, Marseilles Pool (mile 247.8–248.2), which apparently provides preferred habitat for this species.

10. Gamefish populations declined during the low water years 1962–1964, and recovered following the high water years 1971–1973. Largemouth bass populations did not recover to 1959–1962 levels. The recovery appears attributable to improved oxygen levels in the river, and perhaps to increased dilution of toxic materials, and demonstrates how rapidly fish populations respond to improved conditions in the river.

11. The commercial and sport fisheries in the Illinois River have generally declined from levels around the turn of the century. The decline is attributable to a loss of habitat and increasing pollution. Habitat was lost due to leveeing and draining of bottomland areas in the period 1903–1926 and due to sedimentation in the remaining areas. Sedimentation has resulted in undesirable habitat modification, as well as habitat reduction.

12. Northern pike, yellow perch, and walleye (*Stizostedion vitreum vitreum*) were once abundant in the river but are now rare or limited in their distribution. Yellow perch populations have declined probably as the result of the disappearance of beds of aquatic plants and disappearance of clean sand or pebble substrates perch use for spawning.

13. In the past the bottomland lakes and backwater areas offered havens for fish and fish food organisms, as the river became increasingly polluted. Now dissolved oxygen levels in the river seem to have improved, while

the lakes have filled with sediment that apparently exerts an oxygen demand, keeps aquatic plants from growing, and does not support an abundance of food organisms.

14. More and better waste treatment facilities are being constructed by industries and municipalities in the drainage basin of the Illinois River. However, the production of fish and wildlife in the Illinois River and its bottomland lakes is not likely to improve unless sediment pollution is also brought under control.

15. The consequences of future uses of land in the drainage basin and the consequences of future uses of the river must be predicted, so that a wise selection of alternatives can be made. If the river is to be managed in the future for a variety of beneficial uses, then the various state, federal, and private agencies charged with managing land and water within the drainage basin must work in a coordinated fashion, rather than at cross purposes.

GUIDE FOR USE OF TABLES OF ELECTROFISHING RESULTS (Tables 3–27)

SYMBOL	EXPLANATION
1	Dresden Pool, Des Plaines River—*not* included in tabulated value for the Illinois River at bottom of each table.
2	Values represent the total number of fish or total weight of fish taken during the designated year in the Illinois River divided by the number of half-hour intervals fished. Illinois River pools are Alton, La Grange, Peoria, Starved Rock and Marseilles. The Dresden Pool, Des Plaines River, is excluded from this tabulation.
#	Denotes less than 0.01 kilograms or fish per 30 minutes fished.

Note: Fish species are listed in phylogenetic order. All common and scientific names are taken from *A List of Common and Scientific Names of Fishes from the United States and Canada,* 3rd edition, 1970, American Fisheries Society Special Publication No. 6. Species that were rarely taken by electrofishing are not shown in the tables, but are discussed in the text. The values in the body of each table are determined by summing the number of fish or weight of fish obtained at all stations in the navigation pool and dividing the sum by the total number of half-hour intervals fished in that pool. Thus the values are average catches per unit effort for each pool. The number of electrofishing stations in each pool are as follows: Alton Pool (4–5), La Grange Pool (6), Peoria Pool (8), Starved Rock Pool (2), Marseilles Pool (3), and Dresden Pool (1).

Table 1.—Illinois Natural History Survey electrofishing sites on the Illinois Waterway, 1959–1974.

Pool	*Station*	*River Mile*[a]
Alton	Mortland Island Chute Below Hardin	18.7–19.4
	Diamond Island Chute Above Hardin	24.0–25.5
	Hurricane Island Chute Above Hardin	26.0–27.2
	Crater Island and Willow Island Chutes Below Kampsville	29.3–30.7
	Big Blue Island Chute[b] Above Florence	57.5–58.9
La Grange	Bar Island and Grape Island Chutes Below Beardstown	86.2–87.1
	Sugar Creek Island Chute Below Browning	94.3–95.2
	Lower Bath Chute Above Browning	106.8–107.5
	Upper Bath Chute Above Bath	112.8–113.3
	Turkey Island Chute Above Kingston Mines	147.3–148.2
	Illinois River Above Pekin	154.5–155.3
Peoria	Lower Peoria Lake Near East Peoria	163.0–163.4
	Middle Peoria Lake Near Peoria Heights Conservation Landing at Detweiller Park	169.2–171.0

Table 1.—Continued

Pool	*Station*	*River Mile*[a]
Peoria	Chillicothe Island Chute Above Chillicothe	180.1–181.0
	Henry Island Chute Below Henry	193.5–194.1
	Lower Twin Sisters Island Chute Above Henry	202.2–203.1
	Upper Twin Sisters Island Chute Above Henry	203.1–203.5
	Hennepin Island Chute At Hennepin	207.0–208.0
	Clark Island Chute Below Spring Valley	214.9–215.6
Starved Rock	Bulls Island Chute Above Ottawa	240.5–241.1
	Bulls Island Bend Section Above Ottawa	241.4–241.9
Marseilles	Ballard Island Chute Above Marseilles	247.8–248.2
	Johnson Island Chute Above Marseilles	249.4–249.9
	Sugar Island Chute Below Morris	260.2–261.0
Dresden, Des Plaines River	Rapp's Boat Yard and Du Page River Mouth Above Channahon	276.8–277.8

[a] Stations are located by river miles rather than by kilometers because existing river charts and navigation aids along the river use mileages.

[b] Fished in 1974 but not in previous years.

Table 2.—Water temperature, dissolved oxygen and Secchi disk (S.D.) visibility values obtained during an electrofishing survey of the Illinois Waterway, 1974.

Pool	Station	River Mile	Date and Time (CST)	Water Temp. °C	D.O.[a] .91 m ppm	D.O.[a] .91 m % Sat.	D.O.[a] Bottom ppm	S.D. Vis. cm
	Mortland Island Chute	18.7–19.4	21 Aug–0930	27.9	6.18	80.5	6.12	18
	Diamond Island Chute	24.0–25.5	21 Aug–1520	29.5	7.31	97.3	7.09	18
Alton	Hurricane Island Chute	26.0–27.2	22 Aug–0835	27.9	6.18	84.4	6.78	23
	Crater and Willow Island Chutes	29.3–30.7	23 Aug–0855	27.4	6.13	77.2	6.10	19
	Big Blue Island Chute	57.5–58.9	27 Aug–1430	27.5	6.18	80.5	6.02	19
	Bar and Grape Island Chutes	86.2–87.1	30 Aug–1130	25.8	5.36	67.5	5.21	20
	Sugar Creek Island Chute	94.3–95.2	16 Sep–1100	20.9	5.69	64.8	5.42	15
La Grange	Lower Bath Chute	106.8–107.5	12 Sep–1000	22.2	7.18	83.7	7.10	20
	Upper Bath Chute	112.8–113.3	12 Sep–1430	23.5	7.85	95.2	7.69	20
	Turkey Island Chute	147.3–148.2	18 Sep–1100	22.5	7.61	89.4	..	18
	Illinois River Proper	154.5–155.3	19 Sep–1345	21.3	8.21	93.2	8.20	18
	Lower Peoria Lake	163.0–163.4	29 Aug–1915	24.2	10.10	121.7	10.13	18
	Middle Peoria Lake	169.2–170.0	10 Oct–1015	13.4	8.61	82.7	8.60	22
	Chillicothe Island Chute	180.1–181.0	30 Sep–1415	16.5	6.50	68.4	5.20	17
Peoria	Henry Island Chute	193.5–194.1	1 Oct–0940	16.1	5.42	55.7	5.43	16
	Lower Twin Sisters	202.2–203.1	2 Oct–0900	16.1	6.31	64.9	6.21	17
	Upper Twin Sisters	203.1–203.5	2 Oct					
	Hennepin Island Chute	207.0–208.0	3 Oct–0920	15.5	6.51	67.0	6.49	28
	Clark Island Chute	214.9–215.6	18 Oct–0900	15.0	7.83	78.0	7.62	42
Starved Rock	Bulls Island Chute	240.5–241.1	17 Oct–0845	17.5	4.41	47.3	4.38	36
	Bulls Island Bend	241.4–241.9	17 Oct					
	Ballard Island Chute	247.8–248.2	16 Oct–1300	14.5	10.40	104.0	..	14
Marseilles	Johnson Island Chute	249.4–249.9	16 Oct–0915	18.5	4.51	48.9	4.44	46
	Sugar Island Chute	260.2–261.0	15 Oct–1000	19.7	5.46	61.1	5.42	41
Dresden Pool, Des Plaines River	Du Page River Mouth	276.8–277.8	14 Oct–1245	22.0	5.09	59.3	..	32

[a] Method: Winkler azide (21 Aug.–19 Sept.); Oxygen analyzer (30 Sept.–18 Oct.).

Table 3.—Shortnose gar (**Lepisosteus platostomus**) taken by electrofishing in the Illinois Waterway, 1959–1974.

	Year and Number of Hours Fished													
	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1973	1974
Pool	12.0	12.5	10.0	44.5	23.5	23.5	26.0	21.5	22.0	22.0	22.0	13.5	19.5	21.8
	Number Per 30 Minutes													
Dresden[1]	0.00			0.00									0.00	0.00
Marseilles	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Starved Rock	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Peoria	0.25	0.20	0.00	0.15	0.00	0.00	0.00	0.00	0.07	0.07	0.00	0.00	0.00	0.00
La Grange	0.00	0.00		0.08	0.15	0.00	0.31	0.17	0.00	0.00	0.00	0.10	0.00	0.10
Alton				0.00	0.00	0.00	0.27	0.00	0.00	0.00	0.00			0.40
Ill. R.[2]	0.10	0.08	0.00	0.07	0.04	0.00	0.15	0.05	0.02	0.02	0.00	#		0.12
	Kilograms Per 30 Minutes													
Dresden[1]	0.00			0.00									0.00	0.00
Marseilles	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Starved Rock	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Peoria	0.20	0.17	0.00	0.12	0.00	0.00	0.00	0.00	0.02	0.01	0.00	0.00	0.00	0.00
La Grange	0.00	0.00		0.03	0.13	0.00	0.09	0.04	0.00	0.00	0.00	0.10	0.00	0.09
Alton				0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.00			0.07
Ill. R.[2]	0.08	0.07	0.00	0.05	0.04	0.00	0.04	0.01	#	#	0.00	0.03	0.00	0.04

Table 4.—Bowfin (**Amia calva**) taken by electrofishing in the Illinois Waterway, 1959–1974.

	Year and Number of Hours Fished													
Pool	1959 12.0	1960 12.5	1961 10.0	1962 44.5	1963 23.5	1964 23.5	1965 26.0	1966 21.5	1967 22.0	1968 22.0	1969 22.0	1970 13.5	1973 19.5	1974 21.8
	Number Per 30 Minutes													
Dresden[1]	0.00			0.00									0.00	0.00
Marseilles	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Starved Rock	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Peoria	0.00	0.00	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
La Grange	0.00	0.00		0.04	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.10	0.00	0.00
Alton				0.00	0.00	0.00	0.00	0.00	0.00	0.13	0.00			0.50
Ill. R.[2]	0.00	0.00	0.05	0.01	0.00	0.00	0.00	0.00	0.00	0.05	0.00	#	0.00	0.01
	Kilograms Per 30 Minutes													
Dresden[1]	0.00			0.00									0.00	0.00
Marseilles	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Starved Rock	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Peoria	0.00	0.00	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
La Grange	0.00	0.00		0.05	0.00	0.00	0.00	0.00	0.00	0.20	0.00	0.39	0.00	0.00
Alton				0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.00			0.39
Ill. R.[2]	0.00	0.00	0.08	0.01	0.00	0.00	0.00	0.00	0.00	0.07	0.00	0.12	0.00	0.01

Table 5.—Gizzard shad (**Dorosoma cepedianum**) taken by electrofishing in the Illinois Waterway, 1959–1974.

	Year and Number of Hours Fished													
Pool	1959 12.0	1960 12.5	1961 10.0	1962 44.5	1963 23.5	1964 23.5	1965 26.0	1966 21.5	1967 22.0	1968 22.0	1969 22.0	1970 13.5	1973 19.5	1974 21.8
	Number Per 30 Minutes													
Dresden[1]	0.00			0.00									3.33	7.30
Marseilles	2.50	4.67	5.50	7.29	14.16	14.00	13.83	20.83	22.17	7.49	20.50	24.70	4.60	13.00
Starved Rock	1.50	1.60	4.00	8.60	13.00	24.00	2.75	13.67	13.00	12.00	15.00	0.30	10.67	9.00
Peoria	21.63	45.90	26.00	218.63	59.12	92.31	103.73	81.21	69.20	43.59	74.00	11.40	21.87	16.20
La Grange	137.75	9.00		99.00	62.93	41.23	29.25	23.50	35.25	38.92	22.33	47.60	10.00	9.40
Alton				34.10	25.00	40.88	2.27	14.25	29.50	4.12	6.13			6.60
Ill. R.[2]	37.00	21.76	19.70	103.62	44.71	53.62	41.21	39.51	42.48	28.07	36.25	29.90	14.25	11.26
	Kilograms Per 30 Minutes													
Dresden[1]	0.00			0.00									0.08	0.05
Marseilles	0.35	0.64	0.86	0.07	0.61	0.28	0.02	0.37	0.73	0.29	0.46	0.76	0.18	0.94
Starved Rock	0.37	0.32	0.47	0.26	0.68	1.11	0.05	0.05	0.42	0.84	0.35	0.09	0.23	0.33
Peoria	1.02	3.27	1.02	1.08	2.18	0.31	0.63	0.66	0.27	0.25	0.25	0.43	0.49	0.80
La Grange	1.44	0.32		0.92	1.59	0.24	1.20	0.90	1.05	1.03	1.22	0.40	0.49	0.69
Alton				0.85	0.34	0.44	0.09	0.49	0.33	0.10	#			0.25
Ill. R.[2]	0.84	1.54	0.93	0.74	1.37	0.38	0.58	0.61	0.56	0.48	0.50	0.46	0.43	0.62

Table 6.—Goldeye (**Hiodon alosoides**) taken by electrofishing in the Illinois Waterway, 1959–1974.

	Year and Number of Hours Fished													
Pool	1959 12.0	1960 12.5	1961 10.0	1962 44.5	1963 23.5	1964 23.5	1965 26.0	1966 21.5	1967 22.0	1968 22.0	1969 22.0	1970 13.5	1973 19.5	1974 21.8
	Number Per 30 Minutes													
Dresden[1]	0.00												0.00	0.00
Marseilles	0.00	0.00	0.00	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.40
Starved Rock	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Peoria	0.00	0.10	0.00	0.00	0.00	0.00	0.13	0.00	0.00	0.07	0.00	0.00	0.00	0.00
La Grange	0.00	0.00		0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.08	0.00
Alton				0.00	0.13	1.13	0.64	0.00	1.50	0.00	0.25			0.00
Ill. R.[2]	0.00	0.04	0.00	0.02	0.02	0.19	0.17	0.00	0.27	0.02	0.05	#	0.03	0.05
	Kilograms Per 30 Minutes													
Dresden[1]	0.00												0.00	0.00
Marseilles	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05
Starved Rock	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Peoria	0.00	0.01	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.01	0.00	0.00	0.00	0.00
La Grange	0.00	0.00		#	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.02	0.00
Alton				0.00	#	0.05	0.07	0.00	0.07	0.00	0.01			0.00
Ill. R.[2]	0.00	#	0.00	#	#	0.01	0.02	0.00	0.01	#	#	#	0.01	#

Table 7.—Mooneye (**Hiodon tergisus**) taken by electrofishing in the Illinois Waterway, 1959–1974.

	Year and Number of Hours Fished													
	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1973	1974
Pool	12.0	12.5	10.0	44.5	23.5	23.5	26.0	21.5	22.0	22.0	22.0	13.5	19.5	21.8
	Number Per 30 Minutes													
Dresden[1]	0.00			0.00									0.00	0.00
Marseilles	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Starved Rock	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Peoria	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10
La Grange	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Alton				0.00	0.12	0.00	0.36	0.00	0.00	0.00	0.00			0.00
Ill. R.[2]	0.00	0.00	0.00	0.00	0.02	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.02
	Kilograms Per 30 Minutes													
Dresden[1]	0.00			0.00									0.00	0.00
Marseilles	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Starved Rock	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Peoria	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	#
La Grange	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Alton				0.00	0.05	0.00	0.03	0.00	0.00	0.00	0.00			0.00
Ill. R.[2]	0.00	0.00	0.00	0.00	0.01	0.00	#	0.00	0.00	0.00	0.00	0.00	0.00	#

Table 8.—Goldfish (**Carassius auratus**) taken by electrofishing in the Illinois Waterway, 1959–1974.

	Year and Number of Hours Fished													
	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1973	1974
Pool	12.0	12.5	10.0	44.5	23.5	23.5	26.0	21.5	22.0	22.0	22.0	13.5	19.5	21.8
	Number Per 30 Minutes													
Dresden[1]	16.50			101.25									34.67	18.60
Marseilles	18.00	34.33	33.75	12.64	19.50	7.00	9.50	6.66	7.16	3.83	6.33	6.50	0.40	2.70
Starved Rock	2.50	24.40	64.50	30.50	17.75	16.75	32.75	6.33	6.33	10.67	7.00	15.40	3.33	0.00
Peoria	0.37	0.60	3.07	0.15	0.00	2.56	1.07	0.50	0.33	0.13	1.07	0.20	0.13	0.10
La Grange	0.00	0.14		0.42	1.16	0.62	1.81	0.25	0.08	0.00	0.17	0.10	0.00	0.00
Alton				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			0.00
Ill. R.[2]	4.25	9.28	15.35	5.84	4.32	3.36	4.48	1.61	1.55	1.30	1.75	3.30	0.39	0.14
	Kilograms Per 30 Minutes													
Dresden[1]	2.37			..									4.53	2.27
Marseilles	3.21	6.09	5.72	2.48	3.51	1.17	1.59	1.14	1.51	0.24	1.16	1.32	0.10	0.20
Starved Rock	0.34	2.76	6.71	4.50	2.88	1.99	4.18	1.07	1.18	2.09	1.40	3.28	0.89	0.00
Peoria	0.05	0.07	0.16	0.01	0.00	0.07	0.06	0.03	0.01	0.01	0.05	0.02	0.01	0.10
La Grange	0.00	0.02		0.03	0.05	0.10	0.25	0.06	#	0.00	0.01	0.02	0.00	0.00
Alton				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			0.00
Ill. R.[2]	0.73	1.32	1.92	0.95	0.71	0.37	0.60	0.26	0.29	0.18	0.27	0.68	0.10	0.05

Table 9.—Carp x Goldfish (**Cyprinus carpio** x **Carassius auratus**) taken by electrofishing in the Illinois Waterway, 1959–1974.

	Year and Number of Hours Fished													
	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1973	1974
Pool	12.0	12.5	10.0	44.5	23.5	23.5	26.0	21.5	22.0	22.0	22.0	13.5	19.5	21.8
	Number Per 30 Minutes													
Dresden[1]	2.50			1.00									0.00	0.70
Marseilles	2.50	0.67	0.75	2.79	1.00	0.83	0.83	0.50	0.16	0.33	0.33	0.50	0.00	0.00
Starved Rock	0.75	4.00	0.50	3.50	3.25	1.25	4.75	1.67	3.33	1.67	1.00	1.30	0.67	0.70
Peoria	0.00	0.40	0.71	0.81	0.81	1.12	1.53	2.71	2.27	1.60	1.67	2.60	1.60	1.60
La Grange	0.25	0.00		0.04	0.15	0.62	0.25	0.34	0.25	0.00	0.17	0.00	0.00	0.30
Alton				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			0.10
Ill. R.[2]	0.70	1.04	0.70	1.14	0.73	0.77	0.98	1.16	1.09	0.70	0.73	1.20	0.72	0.64
	Kilograms Per 30 Minutes													
Dresden[1]	0.78			..									0.00	0.26
Marseilles	1.30	0.19	0.27	1.75	0.82	0.99	0.54	0.25	0.05	0.86	0.21	0.17	0.00	0.00
Starved Rock	0.73	4.05	0.57	2.05	1.75	0.82	3.11	0.80	2.20	1.12	0.63	0.69	0.36	0.40
Peoria	0.00	0.18	0.18	0.29	0.20	0.27	0.43	0.78	0.63	0.42	0.46	0.80	0.39	0.33
La Grange	0.13	0.00		#	#	0.12	0.07	0.08	0.08	0.00	0.05	0.00	0.00	0.05
Alton				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			0.04
Ill. R.[2]	0.44	0.91	0.24	0.62	0.32	0.32	0.45	0.37	0.40	0.34	0.24	0.41	0.19	0.15

Table 10.—Carp (**Cyprinus carpio**) taken by electrofishing in the Illinois Waterway, 1959–1974.

	Year and Number of Hours Fished													
Pool	1959 12.0	1960 12.5	1961 10.0	1962 44.5	1963 23.5	1964 23.5	1965 26.0	1966 21.5	1967 22.0	1968 22.0	1969 22.0	1970 13.5	1973 19.5	1974 21.8
	Number Per 30 Minutes													
Dresden[1]	8.00			18.25									6.00	16.00
Marseilles	10.00	5.33	20.25	9.07	19.33	15.17	21.00	12.00	19.50	13.17	10.00	16.70	14.80	13.80
Starved Rock	3.00	28.60	53.00	25.00	26.75	11.00	31.50	19.67	15.33	9.00	9.67	18.00	4.00	10.30
Peoria	13.25	11.20	36.00	17.70	17.56	18.81	14.53	19.72	18.13	17.73	20.60	18.20	10.60	27.40
La Grange	15.00	20.71		28.42	51.69	77.39	14.63	61.75	37.59	38.91	27.58	21.60	25.23	30.50
Alton				10.70	24.50	36.63	12.55	21.87	20.88	16.00	19.50			15.70
Ill. R.[2]	10.90	16.64	34.55	19.34	29.19	36.92	16.19	30.77	23.93	21.98	20.11	18.90	15.92	22.74
	Kilograms Per 30 Minutes													
Dresden[1]	6.36			. .									4.06	7.05
Marseilles	7.53	4.45	12.40	6.67	13.34	12.53	16.70	11.55	16.51	9.91	7.91	14.91	8.66	8.76
Starved Rock	2.09	17.25	12.99	20.12	17.71	4.70	11.84	6.10	9.24	5.98	5.67	7.70	3.15	4.90
Peoria	6.81	6.70	10.26	8.18	8.00	5.79	5.72	6.90	7.78	7.22	10.17	14.13	4.84	9.78
La Grange	7.72	14.73		18.63	29.46	37.51	7.73	23.60	15.62	15.83	12.34	12.91	14.91	15.23
Alton				9.82	26.90	41.87	11.19	20.73	18.19	12.90	16.18			13.28
Ill. R.[2]	6.19	10.79	10.96	12.48	18.66	21.47	9.23	14.73	12.98	10.89	11.24	13.23	8.87	11.58

Table 11.—River carpsucker (**Carpiodes carpio**) taken by electrofishing in the Illinois Waterway, 1959–1974.

	Year and Number of Hours Fished													
Pool	1959 12.0	1960 12.5	1961 10.0	1962 44.5	1963 23.5	1964 23.5	1965 26.0	1966 21.5	1967 22.0	1968 22.0	1969 22.0	1970 13.5	1973 19.5	1974 21.8
	Number Per 30 Minutes													
Dresden[1]	0.00			0.00									0.00	0.00
Marseilles	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.17	0.00	0.00	0.00	0.00	0.40
Starved Rock	0.00	0.60	0.00	0.10	0.00	0.00	0.00	0.33	0.00	0.33	0.00	0.00	1.00	2.40
Peoria	0.12	0.70	1.71	0.19	0.00	0.00	0.07	0.07	0.67	0.40	0.13	0.10	0.73	1.30
La Grange	0.75	0.43		0.08	0.15	0.15	0.81	0.00	1.17	1.08	0.09	0.00	0.31	0.10
Alton				0.30	0.25	0.00	0.64	0.62	0.12	0.50	0.00			0.00
Ill. R.[2]	0.20	0.52	1.20	0.13	0.09	0.04	0.40	0.16	0.59	0.55	0.07	0.01	0.50	0.67
	Kilograms Per 30 Minutes													
Dresden[1]	0.00			0.00									0.00	0.00
Marseilles	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.24
Starved Rock	0.00	0.17	0.00	0.05	0.00	0.00	0.00	0.18	0.00	0.22	0.00	0.00	0.43	0.88
Peoria	0.05	0.15	0.14	0.05	0.00	0.00	0.01	#	0.21	0.14	0.10	0.06	0.21	0.31
La Grange	0.43	0.03		0.02	0.09	0.04	0.23	0.00	0.22	0.25	0.05	0.00	0.15	0.02
Alton				0.07	0.10	0.00	0.21	0.27	0.02	0.19	0.00			0.00
Ill. R.[2]	0.11	0.10	0.10	0.04	0.04	0.01	0.12	0.06	0.15	0.16	0.05	0.02	0.18	0.20

Table 12.—Quillback carpsucker (**Carpiodes cyprinus**) taken by electrofishing in the Illinois Waterway, 1959–1974.

	Year and Number of Hours Fished													
Pool	1959 12.0	1960 12.5	1961 10.0	1962 44.5	1963 23.5	1964 23.5	1965 26.0	1966 21.5	1967 22.0	1968 22.0	1969 22.0	1970 13.5	1973 19.5	1974 21.8
	Number Per 30 Minutes													
Dresden[1]	0.00			0.00									0.00	0.00
Marseilles	0.00	0.00	0.25	0.00	0.17	1.33	0.00	0.50	2.00	1.33	1.17	1.50	1.00	0.70
Starved Rock	0.00	0.40	0.00	0.60	1.75	2.75	3.00	2.00	1.67	2.67	1.00	1.40	0.67	1.40
Peoria	0.00	0.30	0.36	0.22	1.13	0.88	0.33	0.79	0.60	1.33	1.13	0.10	0.13	0.00
La Grange	0.00	0.00		0.08	0.54	0.23	0.19	0.25	0.00	0.33	0.34	0.00	0.15	0.00
Alton				0.00	0.25	0.00	0.09	0.00	0.00	0.13	0.38			0.10
Ill. R.[2]	0.00	0.20	0.30	0.16	0.75	0.77	0.40	0.54	0.59	0.93	0.77	0.50	0.31	0.19
	Kilograms Per 30 Minutes													
Dresden[1]	0.00			0.00									0.00	0.00
Marseilles	0.00	0.00	0.04	0.00	0.07	0.59	0.00	0.20	0.34	0.29	0.38	0.32	0.36	0.27
Starved Rock	0.00	0.12	0.00	0.23	0.64	0.98	0.95	0.65	0.65	0.82	0.36	0.70	0.38	0.53
Peoria	0.00	0.04	0.04	0.07	0.34	0.09	0.09	0.20	0.13	0.40	0.44	0.03	0.06	0.00
La Grange	0.00	0.00		0.04	0.05	0.03	0.06	0.06	0.00	0.05	0.08	0.00	0.03	0.00
Alton				0.00	0.08	0.00	0.01	0.00	0.00	0.03	0.12			
Ill. R.[2]	0.00	0.04	0.04	0.06	0.20	0.20	0.12	0.16	0.14	0.25	0.27	0.16	0.12	0.07

Table 13.—Smallmouth buffalo (**Ictiobus bubalus**) taken by electrofishing in the Illinois Waterway, 1959–1974.

	Year and Number of Hours Fished													
Pool	1959 12.0	1960 12.5	1961 10.0	1962 44.5	1963 23.5	1964 23.5	1965 26.0	1966 21.5	1967 22.0	1968 22.0	1969 22.0	1970 13.5	1973 19.5	1974 21.8
	Number Per 30 Minutes													
Dresden[1]	0.00			0.00									0.00	0.00
Marseilles	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.17	0.00	0.00	0.10	0.20	0.00
Starved Rock	0.00	0.60	0.00	0.00	0.00	0.00	0.00	0.00	0.33	0.00	0.00	0.30	0.33	2.00
Peoria	0.13	0.20	0.36	0.56	0.75	1.87	0.13	0.79	1.47	1.20	0.60	0.20	0.40	0.70
La Grange	5.25	0.00		1.54	2.31	0.62	0.25	0.25	0.83	0.17	1.34	0.60	0.08	0.30
Alton				0.60	0.13	0.00	0.00	0.00	0.12	0.00	0.12			0.00
Ill. R.[2]	1.10	0.20	0.25	0.68	0.91	0.81	0.12	0.33	0.80	0.45	0.59	0.30	0.25	0.45
	Kilograms Per 30 Minutes													
Dresden[1]	0.00			0.00									0.00	0.00
Marseilles	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.02	0.00
Starved Rock	0.00	0.64	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.00	0.00	0.14	0.42	1.10
Peoria	0.10	0.04	0.29	0.34	0.52	1.03	0.14	0.35	0.54	0.45	0.31	0.10	0.21	0.33
La Grange	1.66	0.00		0.73	2.20	0.38	0.18	0.09	0.21	0.05	0.57	0.38	0.02	0.24
Alton				0.13	0.03	0.00	0.00	0.00	0.04	0.00	0.10			0.00
Ill. R.[2]	0.37	0.15	0.20	0.33	0.79	0.45	0.10	0.14	0.26	0.17	0.28	0.16	0.13	0.25

Table 14.—Bigmouth buffalo (**Ictiobus cyprinellus**) taken by electrofishing in the Illinois Waterway, 1959–1974.

	Year and Number of Hours Fished													
Pool	1959 12.0	1960 12.5	1961 10.0	1962 44.5	1963 23.5	1964 23.5	1965 26.0	1966 21.5	1967 22.0	1968 22.0	1969 22.0	1970 13.5	1973 19.5	1974 21.8
	Number Per 30 Minutes													
Dresden[1]	0.00			0.00									0.00	0.00
Marseilles	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.20
Starved Rock	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.33	0.00	0.00	0.00	0.00	0.00	0.30
Peoria	2.25	0.70	2.57	3.89	4.56	5.12	5.00	9.22	12.20	6.87	6.20	0.90	4.33	17.20
La Grange	9.75	3.29		5.21	9.54	8.92	1.44	3.33	5.25	1.33	0.83	0.40	1.92	3.50
Alton				0.60	0.50	0.62	0.00	0.37	0.63	0.13	0.12			0.00
Ill. R.[2]	2.85	1.20	1.80	2.78	4.28	4.32	1.88	4.03	5.70	2.73	2.36	0.50	2.50	6.48
	Kilograms Per 30 Minutes													
Dresden[1]	0.00			0.00									0.00	0.00
Marseilles	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07
Starved Rock	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.19	0.00	0.00	0.00	0.00	0.00	0.12
Peoria	1.02	0.73	3.67	4.98	5.96	6.08	6.18	9.97	13.11	8.36	8.11	1.18	2.30	8.15
La Grange	10.12	4.77		4.27	8.24	8.67	1.81	3.68	6.98	1.43	1.17	0.68	1.14	1.74
Alton				0.47	0.71	0.86	0.00	1.01	0.78	0.14	0.33			0.00
Ill. R.[2]	2.43	1.62	2.57	2.84	4.43	4.61	2.34	4.47	6.66	3.27	3.14	0.64	1.37	3.09

Table 15.—Black buffalo (**Ictiobus niger**) taken by electrofishing in the Illinois Waterway, 1959–1974.

	Year and Number of Hours Fished													
Pool	1959 12.0	1960 12.5	1961 10.0	1962 44.5	1963 23.5	1964 23.5	1965 26.0	1966 21.5	1967 22.0	1968 22.0	1969 22.0	1970 13.5	1973 19.5	1974 21.8
	Number Per 30 Minutes													
Dresden[1]	0.00			0.00									0.00	0.00
Marseilles	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Starved Rock	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.30
Peoria	0.00	0.10	0.50	0.52	0.06	0.07	0.00	0.22	0.00	0.33	0.40	0.40	0.00	0.00
La Grange	0.50	0.00		0.33	1.08	0.46	0.06	0.08	0.33	0.08	0.00	0.00	0.15	0.00
Alton				0.00	0.00	0.12	0.00	0.12	0.00	0.13	0.00			0.00
Ill. R.[2]	0.10	0.04	0.35	0.26	0.32	0.17	0.02	0.12	0.09	0.16	0.14	0.20	0.06	0.01
	Kilograms Per 30 Minutes													
Dresden[1]	0.00			0.00									0.00	0.00
Marseilles	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Starved Rock	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.22
Peoria	0.00	#	0.58	0.68	0.12	0.11	0.00	0.12	0.00	0.32	0.42	0.46	0.00	0.00
La Grange	0.31	0.00		0.32	1.19	0.62	0.02	0.06	0.41	0.14	0.00	0.00	0.16	0.00
Alton				0.00	0.00	0.22	0.00	0.21	0.00	0.11	0.00			0.00
Ill. R.[2]	0.06	0.00	0.40	0.31	0.37	0.25	#	0.10	0.11	0.17	0.15	0.17	0.06	#

Table 16.—Shorthead redhorse (**Moxostoma macrolepidotum**) taken by electrofishing in the Illinois Waterway, 1959–1974.

	Year and Number of Hours Fished													
Pool	1959 12.0	1960 12.5	1961 10.0	1962 44.5	1963 23.5	1964 23.5	1965 26.0	1966 21.5	1967 22.0	1968 22.0	1969 22.0	1970 13.5	1973 19.5	1974 21.8
	Number Per 30 Minutes													
Dresden[1]	. .			0.00									0.33	0.70
Marseilles	0.00	0.00	0.00	0.07	0.17	0.00	0.16	0.17	0.17	0.00	0.00	0.00	0.00	0.00
Starved Rock	0.00	0.80	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.30	0.67	0.00
Peoria	0.13	0.10	0.07	0.11	0.06	0.13	0.07	0.00	0.00	0.00	0.07	0.10	0.33	0.10
La Grange	0.75	0.29		0.04	0.00	0.08	0.44	0.17	0.00	0.08	0.08	0.40	0.15	0.30
Alton				0.00	0.00	0.00	0.00	0.00	0.00	0.13	0.00			0.60
Ill. R.[2]	0.20	0.28	0.05	0.08	0.04	0.07	0.17	0.07	0.02	0.04	0.05	0.20	0.25	0.26
	Kilograms Per 30 Minutes													
Dresden[1]	0.05			0.00									0.05	0.15
Marseilles	0.00	0.00	0.00	0.01	0.01	0.00	0.04	#	0.04	0.00	0.00	0.00	0.00	0.00
Starved Rock	0.00	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.23	0.00
Peoria	0.10	0.02	0.03	0.03	#	0.02	0.01	0.00	0.00	0.00	#	#	0.05	0.03
La Grange	0.05	0.01		0.00	0.00	#	0.05	0.03	0.00	#	0.01	0.02	0.06	0.05
Alton				0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00			0.23
Ill. R.[2]	0.05	0.04	0.02	0.01	#	0.01	0.02	0.01	#	#	#	0.02	0.06	0.08

Table 17.—Black bullhead (**Ictalurus melas**) taken by electrofishing in the Illinois Waterway, 1959–1974.

	Year and Number of Hours Fished													
Pool	1959 12.0	1960 12.5	1961 10.0	1962 44.5	1963 23.5	1964 23.5	1965 26.0	1966 21.5	1967 22.0	1968 22.0	1969 22.0	1970 13.5	1973 19.5	1974 21.8
	Number Per 30 Minutes													
Dresden[1]	0.00			0.00									0.00	0.00
Marseilles	0.50	2.00	2.00	1.36	2.17	2.17	4.67	4.33	3.50	6.50	2.50	3.50	6.60	19.60
Starved Rock	0.00	0.60	2.00	0.20	0.00	0.00	2.25	0.00	0.33	0.00	0.00	0.00	0.00	0.00
Peoria	0.13	1.00	1.21	1.00	0.56	0.12	0.13	0.22	0.13	0.00	0.06	0.10	0.07	0.10
La Grange	0.00	0.00		0.00	0.08	0.00	0.19	0.75	0.42	0.08	0.08	0.00	0.00	0.00
Alton				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			0.00
Ill. R.[2]	0.15	0.76	1.45	0.56	0.49	0.32	0.81	0.88	0.66	0.91	0.39	0.80	0.94	2.12
	Kilograms Per 30 Minutes													
Dresden[1]	0.00			0.00									0.00	0.00
Marseilles	0.14	0.31	0.29	0.12	0.15	0.06	0.24	0.18	0.16	0.35	0.20	0.37	0.35	0.53
Starved Rock	0.00	0.11	0.14	0.03	0.00	0.00	0.22	0.00	0.05	0.00	0.00	0.00	0.00	0.00
Peoria	0.04	0.15	0.21	0.12	0.05	#	#	0.03	#	0.00	0.01	0.02	0.01	0.01
La Grange	0.00	0.00		0.00	#	0.00	0.01	0.01	0.04	#	#	0.00	0.00	0.00
Alton				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			0.00
Ill. R.[2]	0.04	0.12	0.22	0.06	0.04	0.01	0.05	0.04	0.04	0.05	0.03	0.09	0.06	0.06

Table 18.—Yellow bullhead (**Ictalurus natalis**) taken by electrofishing in the Illinois Waterway, 1959–1974.

	Year and Number of Hours Fished													
Pool	1959 12.0	1960 12.5	1961 10.0	1962 44.5	1963 23.5	1964 23.5	1965 26.0	1966 21.5	1967 22.0	1968 22.0	1969 22.0	1970 13.5	1973 19.5	1974 21.8
	Number Per 30 Minutes													
Dresden[1]	0.00			0.00									0.00	0.00
Marseilles	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Starved Rock	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Peoria	0.00	0.00	0.00	0.15	0.06	0.06	0.07	0.21	0.07	0.07	0.13	0.00	0.07	0.10
La Grange	0.00	0.72		0.04	0.08	0.15	0.00	0.08	0.08	0.00	0.08	0.00	0.00	0.10
Alton				0.00	0.00	0.12	0.00	0.00	0.00	0.00	0.00			0.00
Ill. R.[2]	0.00	0.20	0.00	0.06	0.04	0.08	0.02	0.09	0.05	0.02	0.07	0.00	0.03	0.07
	Kilograms Per 30 Minutes													
Dresden[1]	0.00			0.00									0.00	0.00
Marseilles	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Starved Rock	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Peoria	0.00	0.00	0.00	0.02	0.01	0.01	0.02	0.07	#	0.01	0.01	0.00	0.02	0.03
La Grange	0.00	0.09		0.01	0.01	0.03	0.00	#	0.02	0.00	0.01	0.00	0.00	0.03
Alton				0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00			0.00
Ill. R.[2]	0.00	0.02	0.00	0.01	#	0.01	#	0.02	#	#	0.01	0.00	0.01	0.02

Table 19.—Channel catfish (**Ictalurus punctatus**) taken by electrofishing in the Illinois Waterway, 1959–1974.

	Year and Number of Hours Fished													
Pool	1959 12.0	1960 12.5	1961 10.0	1962 44.5	1963 23.5	1964 23.5	1965 26.0	1966 21.5	1967 22.0	1968 22.0	1969 22.0	1970 13.5	1973 19.5	1974 21.8
	Number Per 30 Minutes													
Dresden[1]	0.00			0.00									0.00	0.00
Marseilles	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.20
Starved Rock	0.00	0.20	0.00	0.70	0.00	0.00	1.25	0.33	0.00	0.00	0.00	0.30	2.00	0.00
Peoria	0.00	0.20	0.14	0.19	0.00	0.00	0.13	0.07	0.13	0.20	0.47	0.00	0.40	0.40
La Grange	0.00	4.00		1.46	2.69	0.31	0.25	2.67	2.42	2.51	1.42	1.10	0.62	1.30
Alton				3.50	8.50	2.37	2.00	3.00	1.63	4.75	2.75			5.30
Ill. R.[2]	0.00	1.24	0.10	0.96	2.19	0.51	0.64	1.35	1.00	1.62	1.05	0.40	0.56	1.74
	Kilograms Per 30 Minutes													
Dresden[1]	0.00			0.00									0.00	0.00
Marseilles	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.19
Starved Rock	0.00	0.05	0.00	0.34	0.00	0.00	0.17	0.00	0.00	0.00	0.00	0.02	0.66	0.00
Peoria	0.00	0.03	0.02	0.07	0.00	0.00	0.01	0.01	0.04	0.05	0.31	0.00	0.21	0.19
La Grange	0.00	0.57		0.35	0.79	0.12	0.07	0.28	0.42	0.45	0.25	0.44	0.46	0.44
Alton				0.88	2.13	1.01	0.25	1.47	0.68	0.84	0.90			1.91
Ill. R.[2]	0.00	0.18	0.01	0.26	0.58	0.20	0.09	0.35	0.24	0.29	0.34	0.13	0.31	0.65

Table 20.—Flathead catfish (**Pylodictis olivaris**) taken by electrofishing in the Illinois Waterway, 1959–1974.

	Year and Number of Hours Fished													
	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1973	1974
Pool	12.0	12.5	10.0	44.5	23.5	23.5	26.0	21.5	22.0	22.0	22.0	13.5	19.5	21.8
	Number Per 30 Minutes													
Dresden[1]	0.00			0.00									0.00	0.00
Marseilles	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Starved Rock	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Peoria	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
La Grange	0.00	0.00		0.00	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.40	0.08	0.60
Alton				0.30	0.13	0.00	0.00	0.00	0.25	0.25	0.25			0.50
Ill. R.[2]	0.00	0.00	0.00	0.04	0.06	0.00	0.00	0.00	0.05	0.05	0.05	0.10	0.03	0.29
	Kilograms Per 30 Minutes													
Dresden[1]	0.00			0.00									0.00	0.00
Marseilles	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Starved Rock	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Peoria	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
La Grange	0.00	0.00		0.00	0.21	0.00	0.00	0.00	0.00	0.00	0.00	1.42	0.05	1.08
Alton				0.04	0.01	0.00	0.00	0.00	0.01	0.06	0.02			0.10
Ill. R.[2]	0.00	0.00	0.00	#	0.06	0.00	0.00	0.00	#	0.01	#	0.42	0.02	0.31

Table 21.—White bass (**Morone chrysops**) taken by electrofishing in the Illinois Waterway, 1959–1974.

	Year and Number of Hours Fished													
	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1973	1974
Pool	12.0	12.5	10.0	44.5	23.5	23.5	26.0	21.5	22.0	22.0	22.0	13.5	19.5	21.8
	Number Per 30 Minutes													
Dresden[1]	0.00			0.00									0.00	0.00
Marseilles	0.00	0.00	0.00	0.00	0.00	0.00	0.17	0.00	0.00	0.00	0.00	0.20	0.20	0.40
Starved Rock	0.00	0.20	0.00	0.20	0.00	0.00	0.75	1.00	0.33	0.00	0.00	1.70	1.33	0.60
Peoria	0.00	0.10	0.00	0.44	0.00	0.25	1.26	0.93	0.66	0.40	0.47	1.30	0.93	2.20
La Grange	0.00	0.29		0.33	0.46	0.15	0.94	0.75	0.58	0.25	0.00	0.80	0.08	0.80
Alton	0.00			4.40	2.62	1.62	1.27	1.00	2.00	3.49	5.75			1.70
Ill. R.[2]	0.00	0.16	0.00	0.78	0.58	0.40	1.00	0.77	0.77	0.84	1.20	0.60	0.56	1.41
	Kilograms Per 30 Minutes													
Dresden[1]	0.00			0.00									0.00	0.00
Marseilles	0.00	0.00	0.00	0.00	0.00	0.00	#	0.00	0.00	0.00	0.00	#	0.01	0.09
Starved Rock	0.00	#	0.00	0.06	0.00	0.00	0.07	0.21	0.10	0.00	0.00	0.07	0.06	0.08
Peoria	0.00	0.02	0.00	0.10	0.00	0.07	0.15	0.26	0.27	0.19	0.12	0.16	0.05	0.21
La Grange	0.00	0.13		0.09	0.06	0.00	0.15	0.20	0.20	0.10	0.00	0.27	#	0.12
Alton	0.00			1.03	0.80	0.26	0.25	0.14	0.62	1.28	1.14			0.50
Ill. R.[2]	0.00	0.05	0.00	0.18	0.15	0.07	0.15	0.18	0.27	0.32	0.25	0.15	0.04	0.23

Table 22.—Green sunfish (**Lepomis cyanellus**) taken by electrofishing in the Illinois Waterway, 1959–1974.

Pool	1959 12.0	1960 12.5	1961 10.0	1962 44.5	1963 23.5	1964 23.5	1965 26.0	1966 21.5	1967 22.0	1968 22.0	1969 22.0	1970 13.5	1973 19.5	1974 21.8
	Year and Number of Hours Fished													
	Number Per 30 Minutes													
Dresden[1]	0.25			0.00									0.67	0.00
Marseilles	0.25	0.33	0.25	0.07	0.00	0.00	0.00	0.17	0.33	0.33	0.67	2.00	1.80	8.00
Starved Rock	0.00	0.00	0.00	0.20	0.25	0.00	0.00	0.33	0.33	1.66	1.33	0.00	3.33	1.70
Peoria	1.00	0.00	1.36	0.74	3.50	1.56	0.27	5.00	2.27	4.80	7.20	1.50	7.20	4.30
La Grange	0.00	2.72		1.00	0.77	1.15	0.19	0.33	0.58	2.25	7.50	2.00	3.54	1.00
Alton				0.10	0.25	1.12	0.00	0.63	0.12	0.00	1.50			1.00
Ill. R.[2]	0.45	0.80	1.00	0.56	1.47	1.04	0.13	1.88	1.02	2.41	4.95	1.60	4.81	2.83
	Kilograms Per 30 Minutes													
Dresden[1]	#			0.00									#	0.00
Marseilles	#	#	0.03	#	0.00	0.00	0.00	#	0.02	0.01	#	0.05	0.05	0.09
Starved Rock	0.00	0.00	0.00	#	#	0.00	0.00	0.01	0.01	0.08	0.05	0.00	0.11	0.05
Peoria	0.04	0.00	0.03	0.03	0.03	#	#	0.09	0.06	0.10	0.14	0.05	0.18	0.10
La Grange	0.00			0.03	0.01	0.01	#	0.01	0.01	0.07	0.20	0.05	0.10	0.51
Alton				#	#	..	0.00	0.01	#	0.00	0.02			0.04
Ill. R.[2]	0.01	0.08	0.03	0.02	0.01	#	#	0.04	0.03	0.06	0.11	0.05	0.13	0.06

Table 23.—Bluegill (**Lepomis macrochirus**) taken by electrofishing in the Illinois Waterway, 1959–1974.

	Year and Number of Hours Fished													
Pool	1959 12.0	1960 12.5	1961 10.0	1962 44.5	1963 23.5	1964 23.5	1965 26.0	1966 21.5	1967 22.0	1968 22.0	1969 22.0	1970 13.5	1973 19.5	1974 21.8
	Number Per 30 Minutes													
Dresden[1]	0.00			0.00									0.00	0.00
Marseilles	0.25	1.00	0.00	0.14	0.17	0.00	0.00	0.00	0.00	0.17	0.00	2.00	0.00	0.90
Starved Rock	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.67	0.00	0.00	0.00
Peoria	1.75	0.20	3.93	3.07	7.31	5.06	0.20	3.14	1.80	1.80	1.80	1.90	2.20	9.30
La Grange	0.25	24.71		11.13	7.54	6.92	0.06	3.34	3.08	5.09	3.08	7.90	4.92	14.60
Alton				4.30	3.50	5.13	0.00	4.38	3.12	3.75	7.25			12.70
Ill. R.[2]	0.80	7.16	2.75	4.65	5.19	4.51	0.08	2.77	2.02	2.70	2.82	3.50	2.69	9.93
	Kilograms Per 30 Minutes													
Dresden[1]	0.00			0.00									0.00	0.00
Marseilles	#	0.04	0.00	#	#	0.00	0.00	0.00	0.00	#	0.00	0.03	0.00	0.04
Starved Rock	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00
Peoria	0.08	#	0.23	0.11	0.05	0.03	#	0.02	0.01	#	0.03	0.05	0.04	0.18
La Grange	#	0.89		0.30	0.06	0.04	#	0.10	0.07	0.18	0.07	0.20	0.12	0.51
Alton				0.12	0.01	0.01	#	0.05	0.12	0.16	0.37			0.50
Ill. R.[2]	0.04	0.26	0.16	0.13	0.04	0.02	#	0.05	0.05	0.08	0.10	0.09	0.06	0.31

Table 24.—Largemouth bass (**Micropterus salmoides**) taken by electrofishing in the Illinois Waterway, 1959–1974.

	Year and Number of Hours Fished													
Pool	1959 12.0	1960 12.5	1961 10.0	1962 44.5	1963 23.5	1964 23.5	1965 26.0	1966 21.5	1967 22.0	1968 22.0	1969 22.0	1970 13.5	1973 19.5	1974 21.8
	Number Per 30 Minutes													
Dresden[1]	0.00			0.00									0.00	0.00
Marseilles	0.00	0.67	0.50	0.07	0.00	0.17	0.00	0.17	0.00	0.17	0.50	0.10	2.40	1.78
Starved Rock	0.00	0.60	0.00	0.00	0.00	0.00	0.25	0.00	0.00	0.00	0.00	0.00	1.00	0.00
Peoria	2.13	3.20	10.36	4.85	2.69	1.13	0.27	0.21	0.87	0.67	0.27	0.80	6.20	5.78
La Grange	8.00	20.71		8.71	2.15	2.15	0.06	0.92	1.17	1.42	1.25	2.50	3.38	2.55
Alton				3.70	0.62	0.63	0.00	1.13	2.50	0.63	1.75			4.30
Ill. R.[2]	2.45	7.28	7.35	4.45	1.62	1.11	0.12	0.56	1.07	0.75	0.82	1.10	4.19	3.74
	Kilograms Per 30 Minutes													
Dresden[1]	0.00			0.00									0.00	0.00
Marseilles	0.00	0.04	0.01	#	0.00	0.01	0.00	0.01	0.00	0.00	0.08	#	0.76	0.15
Starved Rock	0.00	0.23	0.00	0.00	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.21	0.00
Peoria	0.80	0.98	2.32	1.83	0.90	0.36	0.15	0.07	0.15	0.14	0.04	0.22	1.41	1.57
La Grange	2.06	5.11		2.74	0.73	0.64	0.01	0.27	0.33	0.37	0.14	0.31	0.72	0.92
Alton				1.11	0.29	0.12	0.00	0.22	0.64	0.10	0.53			0.94
Ill. R.[2]	0.73	1.87	1.63	1.49	0.56	0.32	0.05	0.14	0.25	0.16	0.16	0.18	0.97	0.99

Table 25.—White crappie (**Pomoxis annularis**) taken by electrofishing in the Illinois Waterway, 1959–1974.

	Year and Number of Hours Fished													
Pool	1959 12.0	1960 12.5	1961 10.0	1962 44.5	1963 23.5	1964 23.5	1965 26.0	1966 21.5	1967 22.0	1968 22.0	1969 22.0	1970 13.5	1973 19.5	1974 21.8
	Number Per 30 Minutes													
Dresden[1]	0.00			0.00									0.00	0.00
Marseilles	0.00	1.67	0.00	0.00	0.00	0.00	0.00	0.33	0.00	0.00	0.00	0.50	0.00	2.00
Starved Rock	0.00	0.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.30
Peoria	0.25	0.00	1.36	1.41	1.31	0.63	0.20	2.64	1.80	0.33	0.47	1.30	3.33	5.50
La Grange	0.00	4.29		3.63	0.62	1.00	0.13	2.08	3.17	3.08	1.25	1.50	0.46	1.50
Alton				0.50	0.88	0.88	0.64	1.00	1.37	1.99	1.63			0.70
Ill. R.[2]	0.10	1.48	0.95	1.53	0.77	0.64	0.23	1.68	1.73	1.32	0.80	1.00	1.56	2.57
	Kilograms Per 30 Minutes													
Dresden[1]	0.00			0.00									0.00	0.00
Marseilles	0.00	0.14	0.00	0.00	0.00	0.00	0.00	0.06	0.00	0.00	0.00	0.06	0.00	0.20
Starved Rock	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07
Peoria	0.01	0.00	0.15	0.17	0.18	0.11	0.00	0.39	0.28	0.08	0.07	0.21	0.50	1.02
La Grange	0.00	0.33		0.31	0.09	0.15	0.03	0.20	0.42	0.47	0.13	0.23	0.05	0.13
Alton				0.10	0.10	0.13	0.08	0.27	0.25	0.34	0.22			0.19
Ill. R.[2]	#	0.11	0.11	0.15	0.10	0.10	0.03	0.24	0.25	0.22	0.10	0.16	0.23	0.44

Table 26.—Black crappie (**Pomoxis nigromaculatus**) taken by electrofishing in the Illinois Waterway, 1959–1974.

	Year and Number of Hours Fished													
Pool	1959 12.0	1960 12.5	1961 10.0	1962 44.5	1963 23.5	1964 23.5	1965 26.0	1966 21.5	1967 22.0	1968 22.0	1969 22.0	1970 13.5	1973 19.5	1974 21.8
	Number Per 30 Minutes													
Dresden[1]	0.00			0.00									0.00	0.00
Marseilles	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.17	0.10	0.00	0.40
Starved Rock	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1.40
Peoria	0.00	0.00	2.36	7.56	1.75	0.56	0.00	1.64	2.33	1.34	1.53	2.60	4.47	8.00
La Grange	0.75	8.71		5.67	1.15	1.85	0.44	5.00	8.00	11.50	8.42	6.90	4.23	9.50
Alton				0.00	2.50	1.50	0.45	1.75	3.63	6.88	8.38			1.80
Ill. R.[2]	0.20	2.44	1.65	4.30	1.34	0.96	0.23	2.26	3.64	4.85	4.36	3.00	3.47	5.62
	Kilograms Per 30 Minutes													
Dresden[1]	0.00			0.00									0.00	0.00
Marseilles	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.05
Starved Rock	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12	0.33
Peoria	0.00	0.00	0.30	1.58	0.29	0.10	0.00	0.24	0.53	0.25	0.31	0.48	0.52	1.37
La Grange	0.08	1.16		1.08	0.12	0.09	0.07	0.50	0.97	1.38	0.82	0.91	0.56	0.74
Alton				0.34	0.25	0.25	0.03	0.24	0.26	0.90	1.48			0.23
Ill. R.[2]	0.01	0.33	0.21	0.85	0.17	0.10	0.03	0.26	0.49	0.63	0.60	0.44	0.43	0.72

Table 27.—Freshwater drum (**Aplodinotus grunniens**) taken by electrofishing in the Illinois Waterway, 1959–1974.

	Year and Number of Hours Fished													
Pool	1959 12.0	1960 12.5	1961 10.0	1962 44.5	1963 23.5	1964 23.5	1965 26.0	1966 21.5	1967 22.0	1968 22.0	1969 22.0	1970 13.5	1973 19.5	1974 21.8
	Number Per 30 Minutes													
Dresden[1]	0.00			0.00									0.00	0.00
Marseilles	0.00	0.00	0.00	0.07	0.00	0.00	0.00	0.00	0.00	0.50	0.33	0.70	0.00	0.40
Starved Rock	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.33	0.00	0.00	0.00
Peoria	0.38	0.10	0.79	0.40	0.06	0.31	0.07	0.00	0.13	0.20	0.53	0.50	0.73	0.60
La Grange	3.25	2.00		0.92	0.69	0.54	1.56	1.33	3.50	2.75	3.92	2.30	4.62	5.00
Alton				0.30	0.87	0.00	3.55	0.38	0.38	1.12	1.12			5.70
Ill. R.[2]	0.80	0.60	0.55	0.45	0.36	0.26	1.25	0.44	1.07	1.09	1.52	1.00	1.97	2.90
	Kilograms Per 30 Minutes													
Dresden[1]	0.00			0.00									0.00	0.00
Marseilles	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	#	0.00	#
Starved Rock	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.00	0.00	0.00
Peoria	0.03	#	0.09	0.06	0.03	0.15	#	0.00	#	0.05	0.18	0.10	0.01	0.03
La Grange	0.33	0.38		0.10	0.11	0.05	0.24	0.14	0.25	0.24	0.62	0.29	0.52	0.46
Alton				0.01	0.09	0.00	0.20	0.05	0.02	0.11	0.12			0.49
Ill. R.[2]	0.08	0.11	0.06	0.06	0.06	0.06	0.12	0.05	0.07	0.10	0.26	0.12	0.19	0.24

Table 28.—Summary of the commercial catch of fish from the Illinois Waterway and the Mississippi River bordering Illinois, 1950–1973.[a]

Species	*1950*	*1954*	*1955*	*1956*	*1957*	*1958*	*1959*	*1960*	*1961*	*1962*	*1963*	*1964*	*1965*	*1966*	*1967*	*1968*	*1969*	*1970*	*1971*	*1972*	*1973*
	Thousand Kilograms																				
Bowfin	5	2	1	1	1	3	3	1	3	3	[b]	1	[b]	[b]	[b]	[b]	1	[b]	[b]	[b]	[b]
Buffalo	622	567	469	365	464	400	486	378	418	344	447	298	279	327	428	385	378	241	209	118	54
Carp	1833	808	1074	851	626	723	596	524	486	537	486	337	330	354	355	246	397	188	342	142	97
Catfish & bullheads	88	85	136	141	106	94	72	74	62	74	60	59	37	40	45	44	67	43	30	28	28
Garfish	..	..	..	..	[b]	1	..	..	[b]	..	[b]	3	1	1	..	2	[b]	[b]	..	..	..
Paddlefish	12	1	4	3	[b]	2	..	[b]	[b]	[b]	[b]	..	..	4	1	[b]	3	3	..	2	[b]
Quillback	..	2	78	..	..	1	3	3	..	..	1	1	..	[b]	1	3	..	[b]	..	..	..
Sheepshead (shovelnose)	52	90	44	82	56	63	24	31	21	27	18	18	10	10	17	9	20	12	20	8	3
Sturgeon	[b]	1	..	..	[b]	..	..	..	..	..	..	..	..	..	..	..	..	[b]	..	..	[b]
Suckers	1	[b]	1	[b]	..	..	..	1	..	..	..	..	..	..	..	..	[b]	..	..	..	[b]
Yellow bass	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Crappie	..	..	11	16	12	15	13	11	14	15	2	..	..	..	..	..	..	..	..	..	..
Carpsucker	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	[b]
Yellow perch	..	[b]	1	..	[b]	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
White bass	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Total fish, Ill. River	2613	1556	1816	1460	1266	1302	1197	1025	1005	1000	1016	717	657	737	848	690	866	487	602	297	182
No. of Ill. River fishermen																					
Full time	106	..	..	..	..	..	..	69	..	..	..	..	..	..	..	..	..	22	9	13	13
Part time	169	..	..	..	..	..	..	73	..	..	..	..	..	..	..	..	..	46	47	42	56
Total fish, Miss. R. bordering Ill.	1326	1236	1766	1501	1462	1909	1973	1916	1440	1571	1664	1469	1574	1567	1317	1211	1310	1442	1379	1473	1637

[a] Most of the statistics were obtained from statistical digests published by the U.S. Dept. of Commerce. The 1972 and 1973 data and the number of full time and part time commercial fishermen on the Illinois River were provided by Mr. Larry Dunham, Fisheries Biologist, Illinois Department of Conservation.

[b] Less than 1000 kg.

Table 29.—Average number of kilograms of fish taken per 30 minutes of electrofishing in each navigation pool of the Illinois Waterway during the period 1959–1974.

		Pools					
		Downstream					*Upstream*
Ref. Table No.	*Species*	*Alton*	*La Grange*	*Peoria*	*Starved Rock*	*Marseilles*	*Dresden*
3	Shortnose gar	0.01	0.04[a]	0.04[a]	0.00	0.00	0.00
4	Bowfin	0.05[a]	0.05	0.01	0.00	0.00	0.00
5	Gizzard shad	0.36	0.88	0.90[a]	0.40	0.47	0.03
6	Goldeye	0.02[a]	#	#	0.00	#	0.00
7	Mooneye	0.01[a]	0.00	#	0.00	0.00	0.00
8	Goldfish	0.00	0.04	0.05	2.38	2.10	3.05[a]
9	Carp x goldfish	#	0.05	0.38	1.37[a]	0.53	0.35
10	Carp	19.01[a]	17.40	8.02	9.24	10.85	5.82
11	River carpsucker	0.10	0.12	0.10	0.14[a]	0.02	0.00
12	Quillback carpsucker	0.03	0.03	0.14	0.50[a]	0.20	0.00
13	Smallmouth buffalo	0.03	0.52[a]	0.34	0.17	#	0.00
14	Bigmouth buffalo	0.48	4.21	5.70[a]	0.02	#	0.00
15	Black buffalo	0.06	0.25[a]	0.20	0.01	0.00	0.00
16	Shorthead redhorse	0.03	0.02	0.02	0.04	0.01	0.06[a]
17	Black bullhead	0.00	#	0.05	0.04	0.24[a]	0.00
18	Yellow bullhead	#	0.01[a]	0.01[a]	0.00	0.00	0.00
19	Channel catfish	1.12[a]	0.36	0.07	0.09	0.01	0.00
20	Flathead catfish	0.03	0.21[a]	0.00	0.00	0.00	0.00
21	White bass	0.67[a]	0.10	0.11	0.05	0.01	0.00
22	Green sunfish	0.01	0.09[a]	0.06	0.02	0.02	#
23	Bluegill	0.15	0.20[a]	0.06	#	0.01	0.00
24	Largemouth bass	0.44	1.11[a]	0.78	0.04	0.08	0.00
25	White crappie	0.19	0.20	0.23[a]	0.01	0.03	0.00
26	Black crappie	0.44	0.65[a]	0.43	0.03	#	0.00
27	Freshwater drum	0.12	0.29[a]	0.05	0.01	#	0.00

[a] Indicates the pool or pools where the maximum number of kilograms of each species was taken in the period 1959–1974.

Less than 0.01 kilogram taken.

Table 30.—Average number of fish taken per 30 minutes of electrofishing in each navigation pool of the Illinois Waterway during the period 1959–1974.

Ref. Table No.	Species	Pools: Downstream Alton	La Grange	Peoria	Starved Rock	Mar-seilles	Upstream Dres-den
3	Shortnose gar	0.07[a]	0.07[a]	0.05	0.00	0.00	0.00
4	Bowfin	0.07[a]	0.02	0.01	0.00	0.00	0.00
5	Gizzard shad	18.09	43.55	63.20[a]	9.22	12.52	2.66
6	Goldeye	0.41[a]	0.02	0.02	0.00	0.03	0.00
7	Mooneye	0.05[a]	0.00	0.01	0.00	0.00	0.00
8	Goldfish	0.00	0.37	0.73	17.02	12.02	42.76[a]
9	Carp x goldfish	0.01	0.18	1.39	2.02[a]	0.80	1.05
10	Carp	19.81	34.69[a]	18.67	18.92	14.29	12.06
11	River carpsucker	0.27	0.39	0.44[a]	0.34	0.04	0.00
12	Quillback carpsucker	0.11	0.16	0.52	1.38[a]	0.71	0.00
13	Smallmouth buffalo	0.11	1.04[a]	0.67	0.25	0.03	0.00
14	Bigmouth buffalo	0.33	4.21	5.79[a]	0.05	0.01	0.00
15	Black buffalo	0.04	0.24[a]	0.19	0.02	0.00	0.00
16	Shorthead redhorse	0.08	0.21	0.09	0.02	0.00	0.00
17	Black bullhead	0.00	0.12	0.35	0.38	4.39[a]	0.00
18	Yellow bullhead	0.01	0.10[a]	0.07	0.00	0.00	0.00
19	Channel catfish	3.76[a]	1.60	0.17	0.34	0.01	0.00
20	Flathead catfish	0.19[a]	0.09	0.00	0.00	0.00	0.00
21	White bass	2.65[a]	0.42	0.64	0.44	0.07	0.00
22	Green sunfish	0.52	1.77	2.91[a]	0.65	1.01	0.23
23	Bluegill	4.90	7.12[a]	3.10	0.06	0.33	0.00
24	Largemouth bass	1.70	4.23[a]	2.82	0.13	0.47	0.00
25	White crappie	1.07	1.75[a]	1.47	0.05	0.32	0.00
26	Black crappie	2.99	5.55[a]	2.44	0.18	0.04	0.00
27	Freshwater drum	1.49	2.49[a]	0.34	0.03	0.14	0.00

[a] Indicates the pool or pools where the maximum number of individuals of each species was taken in the period 1959–1974.

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