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1991 Annual Status Report

A Summary of Fish Data in Six Reaches of the Upper Mississippi River System

February 1998

The Environmental Management Technical Center issues LTRMP Program Reports to provide Long Term Resource Monitoring Program partners with programmatic documentation, procedures manuals, and annual status reports.

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1991 Annual Status Report

A Summary of Fish Data in Six Reaches of the Upper Mississippi River System

by

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Preface

This report is a product of the Long Term Resource Monitoring Program (LTRMP) for the Upper Mississippi River System. The LTRMP was authorized under the Water Resources Development Act of 1986 (Public Law 99-662) as an element of the U.S. Army Corps of Engineers' Environmental Management Program. The LTRMP is being implemented by the Environmental Management Technical Center, a U.S. Geological Survey science center, in cooperation with the five Upper Mississippi River System (UMRS) States of Illinois, Iowa, Minnesota, Missouri, and Wisconsin. The U.S. Army Corps of Engineers provides guidance and has overall Program responsibility. The mode of operation and respective roles of the agencies are outlined in a 1988 Memorandum of Agreement.

The UMRS encompasses the commercially navigable reaches of the Upper Mississippi River, as well as the Illinois River and navigable portions of the Kaskaskia, Black, St. Croix, and Minnesota Rivers. Congress has declared the UMRS to be both a nationally significant ecosystem and a nationally significant commercial navigation system. The mission of the LTRMP is to provide decision makers with information for maintaining the UMRS as a sustainable large river ecosystem given its multiple-use character. The long-term goals of the Program are to understand the system, determine resource trends and effects, develop management alternatives, manage information, and develop useful products.

Data (factual record) and information (usable interpretation of data) are the primary products of the LTRMP. Data on water quality, vegetation, aquatic macroinvertebrates, and fish are collected using a network of six field stations on the Upper Mississippi and Illinois Rivers. Analysis, interpretation, and the reporting of information are conducted at the six field stations and at the Environmental Management Technical Center, the operational center of the LTRMP. Informational products of the LTRMP include professional presentations, reports, and publications in the open and peer-reviewed scientific literature.

This document is an annual status report for 1991, containing a synthesis of data from fish populations and communities in the Upper Mississippi River System. This report satisfies, for 1991, Task 2.2.8.4, *Evaluate and Summarize Annual Results* under Goal 2, *Monitor and Evaluate the Condition of the Upper Mississippi River Ecosystem* as specified in the Operating Plan for the Long Term Resource Monitoring Program (USFWS 1993). This report was developed with funding provided by the Long Term Resource Monitoring Program. The purposes of this annual synthesis report are to provide (1) a systemwide summary of data in standardized tables and figures, and (2) initial identification and interpretation of observed spatial and temporal patterns. The primary data summarized in this report are available from the Environmental Management Technical Center.

1991 Annual Status Report

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Abstract

The Long Term Resource Monitoring Program (LTRMP) completed 2,053 collections of fishes from permanently fixed sampling locations in six study reaches of the Upper Mississippi River System during 1991. Collection methods included day and night electrofishing, hoop netting, fyke netting (two net sizes), gill netting, seining, and trawling in select aquatic area classes. The six LTRMP study areas are Pools 4 (excluding Lake Pepin), 8, 13, and 26 of the Upper Mississippi River, an unimpounded reach of the Mississippi River near Cape Girardeau, Missouri, and the La Grange Pool of the Illinois River. A total of 57–68 fish species were detected in each study area. For each of the six LTRMP study areas, this report contains summaries of: (1) sampling efforts in each combination of gear type and aquatic area class, (2) total catches of each species from each gear type, (3) mean catch-per-unit of gear effort statistics and standard errors for common species from each combination of aquatic area class and selected gear type, and (4) length distributions of common species from selected gear types.

Introduction

The objective of this report is to summarize key features of fish populations and communities from samples collected by field stations of the Long Term Resource Monitoring Program (LTRMP) from the Upper Mississippi River System (UMRS). The fisheries component of the LTRMP is charged, in part, with monitoring and reporting trends in the status of selected fish populations and fish communities of the UMRS (USFWS 1993). Intended as a data summary, this report contains only minimal descriptive syntheses. The LTRMP is required to produce trend reports at 5-year intervals that contain quantitative analyses and systemic syntheses of temporal changes. Further, the LTRMP uses these monitoring data in analyses to address specific issues of concern to LTRMP partners; these analyses are reported in special reports and in the open scientific literature.

Fish are the primary biotic object of recreational and commercial use on the UMRS. During 1982, UMRS fisheries provided more than 8.5 million activity days of sportfishing that generated more than $150 million in direct expenditures (Fremling et al. 1989). Commercial fisheries of the UMRS were valued at more than $2.4 million in 1987 (UMRCC 1989). Adverse trends in fisheries of the UMRS would have detrimental effects on recreation and the regional economy. Therefore, it is important to detect any adverse trends as they occur so that remedial actions can be considered.

Monitoring of and research on fish are also important because fish often affect other ecosystem elements. Although documentation of the effects of fish on other biota is derived primarily from lakes and reservoirs (Northcote 1988), and traditional thought maintains that the dynamics of river biota are influenced primarily by abiotic factors, recent evidence shows that the dynamics of fish assemblages in temperate rivers are regulated in part by biotic factors (Welcomme et al. 1989). Fish may exert influences on other biota in riverine ecosystems and may, therefore, be of broad ecological importance. For example, evidence shows that common carp (*Cyprinus carpio*), an abundant species in the UMRS, may depress or even eliminate macrophytes either through uprooting or disturbance of substrate (Cahn 1929; Macrae 1979). Effects of fish on benthic macroinvertebrates are well known (Northcote 1988). Therefore, trends in abundance of fish may be crucial in explaining trends in abundance of other riverine biota.

Resource monitoring is an important component of long-term ecological research on processes governing large-scale ecosystems. It is nearly impossible to perform experimental manipulations of the UMRS on large spatial scales and to incorporate replication. Long-term data from standardized sampling programs that span natural or anthropogenic disturbances are the only means for gaining an understanding of large-scale processes governing large river systems (Sparks et al. 1990). Further, the LTRMP fisheries component will provide support for the formulation and investigation of research hypotheses concerning smaller scales using focused experimentation. Therefore, the combination of routine monitoring coupled with more intensive investigation of consequences of disturbances and experimentation at reduced spatial and temporal scales is the only available means for better understanding the UMRS and for identifying viable management alternatives.

Study Areas

The LTRMP study areas include six river reaches within the Upper Mississippi River System, five on the Mississippi River and one on the Illinois River (Figure). Study areas are referred to herein by the navigation pool designations according to the U.S. Army Corps of Engineers lock and dam system. Mississippi River navigation pools studied are Pool 4 (river mile 752 to 797), Pool 8 (679 to 703), Pool 13 (523 to 557), Pool 26 (202 to 242), and an unimpounded, open river reach (29 to 80). The remaining study area is the La Grange Pool of the Illinois River (80 to 158).

The LTRMP study areas were chosen, in part, to reflect important differences in geomorphology, floodplain land-use practices, and navigation management strategies that exist within the UMRS (Table 1). Pools 4, 8, and 13 are located in an upper impounded reach characterized by high percentages of open water and aquatic vegetation and low agricultural use (Figure). Relatively high percentages of the total aquatic area in these study reaches are composed of contiguous (to the main channel) backwaters, and relatively low percentages are composed of main channel (Table 1). Qualitatively, Pools 4, 8, and 13 are geomorphically complex and richly braided by side channels and backwaters. Pool 26, in a lower impounded reach, is characterized by relatively low percentages of open water and aquatic vegetation and a high percentage of agriculture in the floodplain. A low percentage of the total aquatic area is composed of contiguous backwaters, and commensurately, a high percentage is composed of the main channel. The Open River study reach is characterized by low percentages of open water and aquatic vegetation and 71.5% agriculture in the floodplain. Of the total aquatic area in the Open River study reach, only 1.8% is contiguous backwater and 79% is main channel (Table 1). The La Grange Pool is similar to Pool 26 in floodplain composition, but is similar to Pools 8 and 13 in composition of the aquatic area (Table 1). In fact, the La Grange Pool has the greatest percentage (52.2%) of contiguous backwaters among the six LTRMP study areas.

Sampling sites are randomly selected within nine strata for each study area: backwater contiguous shoreline (BWCS), backwater contiguous offshore (BWCO), channel trough (CTR), impounded shoreline (IMPS), impounded offshore (IMPO), main channel border unstructured (MCBU), main channel border wing dam (MCBW), side channel border (SCB), tributary mouth (TRI), and tailwater (TWZ). The definitions of sampling strata are based on geomorphic regions that have been mapped and entered into a Geographical Information System.

Figure. Long Term Resource Monitoring Program study reaches.

Table 1. Key features of the floodplain and aquatic area compositions of the Long Term Resource Monitoring Program's five Mississippi and Illinois River study reaches. Aquatic area is that portion of the floodplain that is inundated at normal water elevations. Main channel includes area in the navigation channel and main channel border areas. Data on floodplain composition are from Laustrup and Lowenberg (1994). Data on the composition of aquatic areas are from the Long Term Resource Monitoring Program aquatic areas spatial database.

		Floodplain composition (%)			Aquatic area composition (%)	
Study reach	Floodplain area (ha)	Open water	Aquatic vegetation	Agriculture	Contiguous backwater	Main channel
Pool 4	28,358	50.5	10.0	12.1	21.3	10.5
Pool 8	19,068	40.1	14.4	0.9	30.6	14.2
Pool 13	34,528	29.7	8.6	27.9	28.5	24.7
Pool 26	51,688	13.4	1.4	65.4	17.3	54.4
Open River	105,244	9.9	0.6	71.5	1.8	79.0
La Grange Pool, Illinois River	89,554	15.7	2.2	59.6	52.2	21.3

Methods

Sampling Methods

In this report, we summarize the annual increment of fish data obtained by the LTRMP from fixed-site sampling during 1991. The LTRMP fish monitoring design and sampling protocols, including historical changes, are given in Gutreuter et al. (1995). Readers requiring detailed descriptions should refer to that report. An abbreviated description of the LTRMP design and protocols follows; a list of common and scientific names of fish used in this report is found in Table 2.

Since 1990, the LTRMP has used day and night electrofishing, fyke nets, seines, small mini fyke nets, hoop nets, and small trawls to sample fish in various strata. The following is a summary of sampling gears according to Gutreuter et al. (1995):

Electrofishing

Electrofishing is conducted with pulsed direct current; boat configuration and power output are standardized (Burkhardt and Gutreuter 1995; Gutreuter et al. 1995). Electrofishing effort is of 15-min duration and is paced so that the boat covers a rectangle of about 200 × 30 m. Day and night electrofishing data from these two methods were combined for length–frequency analysis. The unit of effort is a 15-min run.

Table 2. Long Term Resource Monitoring Program list of fishes, arranged phylogenetically by family, then alphabetically by genus and species. Hybrids are listed after respective genera. Nomenclature follows Robins et al. (1991).

Common name	Family name	Scientific name
	Petromyzontidae	
Chestnut lamprey		*Ichthyomyzon castaneus*
Northern brook lamprey		*I. fossor*
Silver lamprey		*I. unicuspis*
Least brook lamprey		*Lampetra aepyptera*
American brook lamprey		*L. appendix*
Sea lamprey		*Petromyzon marinus*
	Carcharhinidae	
Bull shark		*Carcharhinus leucas*
	Acipenseridae	
Lake sturgeon		*Acipenser fulvescens*
Pallid sturgeon		*Scaphirhynchus albus*
Shovelnose sturgeon		*S. platorynchus*
	Polyodontidae	
Paddlefish		*Polyodon spathula*
	Lepisosteidae	
Spotted gar		*Lepisosteus oculatus*
Longnose gar		*L. osseus*
Shortnose gar		*L. platostomus*
Alligator gar		*L. spatula*
	Amiidae	
Bowfin		*Amia calva*
	Hiodontidae	
Goldeye		*Hiodon alosoides*
Mooneye		*H. tergisus*
	Anguillidae	
American eel		*Anguilla rostrata*
	Clupeidae	
Alabama shad		*Alosa alabamae*
Skipjack herring		*A. chrysochloris*
Alewife		*A. pseudoharengus*
Gizzard shad		*Dorosoma cepedianum*
Threadfin shad		*D. petenense*

Table 2. Continued.

Common name	Family name	Scientific name
	Cyprinidae	
Central stoneroller		*Campostoma anomalum*
Largescale stoneroller		*C. oligolepis*
Goldfish		*Carassius auratus*
Lake chub		*Couesius plumbeus*
Grass carp		*Ctenopharyngodon idella*
Red shiner		*Cyprinella lutrensis*
Spotfin shiner		*C. spiloptera*
Blacktail shiner		*C. venusta*
Steelcolor shiner		*C. whipplei*
Common carp		*Cyprinus carpio*
Goldfish × common carp		*Carassius auratus* × *C. carpio*
Gravel chub		*Erimystax x-punctatus*
Western silvery minnow		*Hybognathus argyritis*
Brassy minnow		*H. hankinsoni*
Mississippi silvery minnow		*H. nuchalis*
Plains minnow		*H. placitus*
Silver carp		*Hypopthalmichthys molitrix*
Bighead carp		*H. nobilis*
Striped shiner		*Luxilus chrysocephalus*
Common shiner		*L. cornutus*
Rosefin shiner		*Lythrurus ardens*
Ribbon shiner		*L. fumeus*
Redfin shiner		*L. umbratilis*
Speckled chub		*Macrhybopsis aestivalis*
Sturgeon chub		*M. gelida*
Sicklefin chub		*M. meeki*
Silver chub		*M. storeriana*
Pearl dace		*Margariscus margarita*
Hornyhead chub		*Nocomis biguttatus*
River chub		*N. micropogon*
Golden shiner		*Notemigonus crysoleucas*
Bigeye chub		*Notropis amblops*
Pallid shiner		*N. amnis*
Pugnose shiner		*N. anogenus*
Emerald shiner		*N. atherinoides*
River shiner		*N. blennius*
Bigeye shiner		*N. boops*
Silverjaw minnow		*N. buccatus*
Ghost shiner		*N. buchanani*
Ironcolor shiner		*N. chalybaeus*
Bigmouth shiner		*N. dorsalis*
Blackchin shiner		*N. heterodon*
Blacknose shiner		*N. heterolepis*
Bluehead shiner		*N. hubbsi*
Spottail shiner		*N. hudsonius*
Ozark minnow		*N. nubilus*
Rosyface shiner		*N. rubellus*
Silverband shiner		*N. shumardi*
Sand shiner		*N. stramineus*
Weed shiner		*N. texanus*

Table 2. Continued.

Common name	Family name	Scientific name
Mimic shiner		*N. volucellus*
Channel shiner		*N. wickliffi*
Pugnose minnow		*Opsopoeodus emiliae*
Suckermouth minnow		*Phenacobius mirabilis*
Northern redbelly dace		*Phoxinus eos*
Southern redbelly dace		*P. erythrogaster*
Bluntnose minnow		*Pimephales notatus*
Fathead minnow		*P. promelas*
Bullhead minnow		*P. vigilax*
Flathead chub		*Platygobio gracilis*
Blacknose dace		*Rhinichthys atratulus*
Longnose dace		*R. cataractae*
Creek chub		*Semotilus atromaculatus*
	Catostomidae	
River carpsucker		*Carpiodes carpio*
Quillback		*C. cyprinus*
Highfin carpsucker		*C. velifer*
Longnose sucker		*Catostomus catostomus*
White sucker		*C. commersoni*
Blue sucker		*Cycleptus elongatus*
Creek chubsucker		*Erimyzon oblongus*
Lake chubsucker		*E. sucetta*
Northern hog sucker		*Hypentelium nigricans*
Smallmouth buffalo		*Ictiobus bubalus*
Bigmouth buffalo		*I. cyprinellus*
Black buffalo		*I. niger*
Spotted sucker		*Minytrema melanops*
Silver redhorse		*Moxostoma anisurum*
River redhorse		*M. carinatum*
Black redhorse		*M. duquesnei*
Golden redhorse		*M. erythrurum*
Shorthead redhorse		*M. macrolepidotum*
Greater redhorse		*M. valenciennesi*
	Ictaluridae	
White catfish		*Ameiurus catus*
Black bullhead		*A. melas*
Yellow bullhead		*A. natalis*
Brown bullhead		*A. nebulosus*
Blue catfish		*Ictalurus furcatus*
Channel catfish		*I. punctatus*
Mountain madtom		*Noturus eleutherus*
Slender madtom		*N. exilis*
Stonecat		*N. flavus*
Tadpole madtom		*N. gyrinus*
Brindled madtom		*N. miurus*
Freckled madtom		*N. nocturnus*
Northern madtom		*N. stigmosus*
Flathead catfish		*Pylodictis olivaris*

Table 2. Continued.

Common name	Family name	Scientific name
	Esocidae	
Grass pickerel		*Esox americanus vermiculatus*
Northern pike		*E. lucius*
Muskellunge		*E. masquinongy*
Tiger muskellunge		*E. masquinongy* × *E. lucius*
Chain pickerel		*E. niger*
	Umbridae	
Central mudminnow		*Umbra limi*
	Osmeridae	
Rainbow smelt		*Osmerus mordax*
	Salmonidae	
Cisco		*Coregonus artedi*
Bloater		*C. hoyi*
Coho salmon		*Oncorhynchus kisutch*
Rainbow trout		*O. mykiss*
Brown trout		*Salmo trutta*
Brook trout		*Salvelinus fontinalis*
	Percopsidae	
Trout-perch		*Percopsis omiscomaycus*
	Aphredoderidae	
Pirate perch		*Aphredoderus sayanus*
	Amblyopsidae	
Spring cavefish		*Chologaster agassizi*
	Gadidae	
Burbot		*Lota lota*
	Cyprinodontidae	
Northern studfish		*Fundulus catenatus*
Banded killifish		*F. diaphanus*
Starhead topminnow		*F. dispar*
Blackstripe topminnow		*F. notatus*
Blackspotted topminnow		*F. olivaceus*
	Poeciliidae	
Western mosquitofish		*Gambusia affinis*

Table 2. Continued.

Common name	Family name	Scientific name
	Atherinidae	
Brook silverside		*Labidesthes sicculus*
Mississippi silverside		*Menidia audens*
Inland silverside		*M. beryllina*
	Gasterosteidae	
Brook stickleback		*Culaea inconstans*
Ninespine stickleback		*Pungitius pungitius*
	Cottidae	
Mottled sculpin		*Cottus bairdi*
Banded sculpin		*C. carolinae*
Slimy sculpin		*C. cognatus*
Deepwater sculpin		*Myoxocephalus thompsoni*
	Percichthyidae	
White perch		*Morone americana*
White bass		*M. chrysops*
Yellow bass		*M. mississippiensis*
Striped bass		*M. saxatilis*
White bass × striped bass		*M. chrysops* × *M. saxatilis*
	Centrarchidae	
Shadow bass		*Ambloplites ariommus*
Rock bass		*A. rupestris*
Flier		*Centrarchus macropterus*
Banded pygmy sunfish		*Elassoma zonatum*
Green sunfish		*Lepomis cyanellus*
Pumpkinseed		*L. gibbosus*
Warmouth		*L. gulosus*
Orangespotted sunfish		*L. humilis*
Bluegill		*L. macrochirus*
Longear sunfish		*L. megalotis*
Redear sunfish		*L. microlophus*
Spotted sunfish		*L. punctatus*
Bantam sunfish		*L. symmetricus*
Green sunfish × pumpkinseed		*L. cyanellus* × *L. gibbosus*
Green sunfish × warmouth		*L. cyanellus* × *L. gulosus*
Green sunfish × orangespotted sunfish		*L. cyanellus* × *L. humilis*
Green sunfish × bluegill		*L. cyanellus* × *L. macrochirus*
Green sunfish × redear sunfish		*L. cyanellus* × *L. microlophus*
Green sunfish × unknown		*L. cyanellus* × sp.
Pumpkinseed × warmouth		*L. gibbosus* × *L. gulosus*
Pumpkinseed × orangespotted sunfish		*L. gibbosus* × *L. humilis*
Pumpkinseed × bluegill		*L. gibbosus* × *L. macrochirus*
Orangespotted sunfish × longear sunfish		*L. humilis* × *L. megalotis*
Bluegill × warmouth		*L. macrochirus* × *L. gulosus*

Table 2. Continued.

Common name	Family name	Scientific name
Bluegill × orangespotted sunfish		*L. macrochirus* × *L. humilis*
Bluegill × longear sunfish		*L. macrochirus* × *L. megalotis*
Bluegill × redear sunfish		*L. macrochirus* × *L. microlophus*
Redear sunfish × warmouth		*L. microlophus* × *L. gulosus*
Smallmouth bass		*Micropterus dolomieu*
Spotted bass		*M. punctulatus*
Largemouth bass		*M. salmoides*
White crappie		*Pomoxis annularis*
Black crappie		*P. nigromaculatus*
White crappie × black crappie		*P. annularis* × *P. nigromaculatus*
	Percidae	
Crystal darter		*Ammocrypta asprella*
Western sand darter		*A. clara*
Eastern sand darter		*A. pellucida*
Mud darter		*Etheostoma asprigene*
Greenside darter		*E. blennioides*
Rainbow darter		*E. caeruleum*
Bluebreast darter		*E. camurum*
Bluntnose darter		*E. chlorosomum*
Iowa darter		*E. exile*
Fantail darter		*E. flabellare*
Slough darter		*E. gracile*
Harlequin darter		*E. histrio*
Stripetail darter		*E. kennicotti*
Least darter		*E. microperca*
Johnny darter		*E. nigrum*
Cypress darter		*E. proelaire*
Orangethroat darter		*E. spectabile*
Spottail darter		*E. squamiceps*
Banded darter		*E. zonale*
Yellow perch		*Perca flavescens*
Logperch		*Percina caprodes*
Blackside darter		*P. maculata*
Slenderhead darter		*P. phoxocephala*
Dusky darter		*P. sciera*
River darter		*P. shumardi*
Sauger		*Stizostedion canadense*
Walleye		*S. vitreum*
Sauger × walleye		*S. canadense* × *S. vitreum*
	Sciaenidae	
Freshwater drum		*Aplodinotus grunniens*
	Mugilidae	
Striped mullet		*Mugil cephalus*

Tandem Hoop Netting

The LTRMP uses two sizes of hoop nets. The large nets are composed of seven fiberglass hoops with diameters of 1.1 to 1.2 m. These nets are 4.8 m long, contain two finger-style throats, and are constructed of 3.7-cm (bar measure) nylon mesh. The small nets are composed of seven fiberglass hoops with diameters of 0.5 to 0.6 m. The small nets are 3 m long, contain two finger-style throats, and are constructed of 1.8-cm (bar measure) nylon mesh. Large and small hoop nets are deployed tandemly within sampling sites. Both nets are baited with 3 kg of soybean cake. For this report, the estimates from pairs of nets are pooled and therefore treated as a single gear. The unit of effort is a net-day, which is 24 h of effort by a pair of nets.

Seining

The LTRMP uses 10.7-m-long seines constructed of 3-mm Ace-type nylon mesh. These seines are 1.8 m high and have a 0.9-m^2 bag in the centers. Seines are extended perpendicularly to shorelines and then swept in a 90˚ arc downstream to the shoreline. The unit of effort is a haul.

Fyke Netting

The LTRMP uses Wisconsin-type fyke nets (trap nets) that contain three sections: the lead, frame, and cab. All netting is 1.8-cm (bar measure) mesh. Leads are 15 m long and 1.3 m high. The spring steel frames are 0.9 m high and 1.8 m wide with two internal wing throats. The cabs are constructed of six steel hoops (0.9 m in diameter) containing two throats. These nets are fished singly from shoreline or from beds of dense vegetation or in tandem (with leads connected) offshore. The unit of effort is a net-day, where each frame is one net. Fyke net and tandem fyke net data were combined for length–frequency distribution analysis.

Mini Fyke Netting

Mini fyke nets are small, Wisconsin-type fyke nets. Mesh size is 3-mm Ace-type nylon. The leads are 4.5 m long and 0.6 m high. The spring steel frames are 0.6 m high and 1.2 m wide with two internal wing throats. The cabs are constructed of two steel hoops (0.6 m in diameter) with one throat. These nets are fished singly from shoreline or from beds of dense vegetation or in tandem (with leads connected) offshore. The unit of effort is a net-day, where each frame is one net.

Trawling

Trawling is conducted only at permanently fixed sampling sites in tailwater zones and unstructured channel borders. The LTRMP trawls collect mainly small, bottom-dwelling fish. The trawls are two-seam, 4.8-m slingshot balloon trawls (TRL16BC, Memphis Net and Twine Co., Inc., or the equivalent). The body of the trawl is made of No. 9 nylon with stretch mesh 18 mm in diameter. The cod end is made of No. 18 nylon with stretch mesh 18 mm in diameter. The cod end contains a 1.8-m liner consisting of 3-mm Ace-type nylon mesh. Floats are spaced every 0.91 m along the headrope, and a 4.8-mm steel chain is tied to the footrope. The trawl is equipped with 37-cm-high by 75-cm-long iron "V" doors (otter boards). These trawls are dragged downriver by small, flat-bottomed boats. Trawl speed is barely faster than ambient current speed. The standard unit of trawl effort is a haul. A minimum of six hauls is collected in main or side channel sites and four hauls at tailwater sites.

Statistical Methods

The LTRMP uses mean catch-per-unit-effort (*C/f*) as an index of abundance, as is conventional practice (Ricker 1975). The units of effort are specific to particular gears. For electrofishing and seining, effort is a constant, but for other gears it is somewhat variable. For example, although the effort goal for fyke nets is 1 day (Gutreuter et al. 1995), actual effort may vary between 20 and 30 h. Catch and effort are recorded for each species from individual samples (deployments of particular gears) at unique combinations of time and place. Whenever a species is not caught in a sample, the catch for that species in that sample is zero. Although these zero catches are not recorded, they are reconstructed for analyses.

For an arbitrary random variable denoted *y* (for this report *y* represents *C/f*), the pooled mean, denoted $\bar{y}_{st}$ $\bar{y}_{st}$ (*st* represents stratified) is given by

$$\bar{y}_{st} = \frac{1}{N} \sum_{h=1}^{L} N_h \bar{y}_h \qquad (1)$$

where N_h is the number of sampling units within stratum *h*, $N = \sum_{h=1}^{L} N_h$, and $\bar{y}_h$ denotes the estimator of the simple mean of *y* for stratum *h*. The estimator of the variance of $\bar{y}_{st}$ is

$$s^2(\bar{y}_{st}) = \frac{1}{N^2} \sum_{h=1}^{L} N_h (N_h - n_h) \left(\frac{s_h^2}{n_h} \right) \qquad (2)$$

where

$$s_h^2 = \frac{\sum_{i=1}^{n_h} (y_{hi} - \bar{y}_h)^2}{n_h - 1}$$

is the usual estimator of the variance of y_h and n_h is the number of samples taken in stratum *h* (Cochran 1977). The standard error of $\bar{y}_{st}$ is therefore $s(\bar{y}_{st})$.

In this report, *C/f* statistics are reported for the fixed-site sampling. Equation (1) is used to estimate means of data obtained from fixed-site sampling to maintain computational consistency. The pooled means from fixed-site sampling are not guaranteed unbiased because there is no assurance that the fixed sites were unbiased within the stratum.

Length distribution analysis was performed for 13 selected fish species (gear used): gizzard shad (electrofishing), common carp (electrofishing), smallmouth buffalo (electrofishing; tandem large and small hoop netting), channel catfish (electrofishing; tandem large and small hoop netting), northern pike (electrofishing; fyke and tandem fyke netting), white bass (electrofishing), bluegill (electrofishing; fyke and tandem fyke netting), largemouth bass (electrofishing), white crappie (electrofishing; fyke and tandem fyke netting), black crappie (electrofishing; fyke and tandem fyke netting), sauger (electrofishing), walleye (electrofishing), and freshwater drum (electrofishing; fyke and tandem fyke netting). The data are illustrated in the form of histograms within the following chapters. In some instances, meaningful biological interpretation of these distributions may be limited by small sample size or size selectivity of the gear (Anderson and Neumann 1996). Some fish histograms with small sample sizes (<100) are included in this report because of local interest, while others were omitted (reach dependent).

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References

Anderson, R. O., and R. M. Neumann. 1996. Length, weight, and associated structural indices. Pages 447–482 *in* B. R. Murphy and D. W. Willis, editors. Fisheries techniques. 2nd edition. American Fisheries Society, Bethesda, Maryland.

Burkhardt, R. W., and S. Gutreuter. 1995. Improving electrofishing catch consistency by standardizing power. North American Journal of Fisheries Management 15:375–381.

Cahn, A. R. 1929. The effect of carp on a small lake: The carp as a dominant. Ecology 10:271–274.

Cochran, W. G. 1977. Sampling techniques. 3rd edition. John Wiley & Sons, New York. 428 pp.

Fremling, C. R., J. L. Rasmussen, R. E. Sparks, S. P. Cobb, C. F. Bryan, and T. O. Claflin. 1989. Mississippi River fisheries: A case history. Pages 309–351 *in* D. P. Dodge, editor. Proceedings of the International Large River Symposium, Department of Fisheries and Oceans, Ottawa, Ontario, Canada. Canadian Special Publication of Fisheries and Aquatic Sciences 106.

Gutreuter, S., R. Burkhardt, and K. Lubinski. 1995. Long Term Resource Monitoring Program Procedures: Fish monitoring. National Biological Service, Environmental Management Technical Center, Onalaska, Wisconsin, July 1995. LTRMP 95-P002-1. 42 pp. + Appendixes A–J

Laustrup, M. S., and C. D. Lowenberg. 1994. Development of a systemic land cover/land use database for the Upper Mississippi River System derived from Landsat Thematic Mapper satellite data. National Biological Survey, Environmental Management Technical Center, Onalaska, Wisconsin, May 1994. LTRMP 94-T001. 103 pp.

Macrae, D. A. 1979. The impact of carp on the summer production of aquatic vegetation as indicated by an enclosure experiment and food habits study. M.S. Thesis, Trent University, Peterborough, Ontario, Canada. 110 pp.

Northcote, T. G. 1988. Fish in the structure and function of freshwater ecosystems: A "top-down" view. Canadian Journal of Fisheries and Aquatic Sciences 45:361–379.

Pitlo J., A. Van Vooren, and J. Rasmussen. 1995. Distribution and relative abundance of Upper Mississippi River fishes. Upper Mississippi River Conservation Committee, Rock Island, Illinois. 20 pp.

Ricker, W. E. 1975. Computation and interpretation of biological statistics of fish populations. Bulletin 191. Fisheries Research Board of Canada, Ottawa, Ontario. 382 pp.

Robins, C. R., R. M. Bailey, C. E. Bond, J. R. Brooker, E. A. Lachner, R. N. Lea, and W. B. Scott. 1991. Common and scientific names of fishes from the United States and Canada. 5th edition. Special Publication 20. American Fisheries Society, Bethesda, Maryland. 183 pp.

Smith, P. W. 1979. The fishes of Illinois. University of Illinois Press, Urbana. 314 pp.

Sparks, R. E., P. B. Bayley, S. L. Kohler, and L. L. Osborne. 1990. Disturbance and recovery of large floodplain rivers. Environmental Management 14:699–709.

UMRCC (Upper Mississippi River Conservation Committee). 1989. Upper Mississippi River commercial fisheries statistics for 1987. Pages 145–151 *in* Proceedings of the forty-fifth annual meeting of the Upper Mississippi River Conservation Committee. Upper Mississippi River Conservation Committee, Rock Island, Illinois.

Welcomme, R. L., R. A. Ryder, and J. A. Sedell. 1989. Dynamics of fish assemblages in river systems—A synthesis. Pages 577–599 *in* D. P. Dodge, editor. Proceedings of the International Large River Symposium, Department of Fisheries and Oceans, Ottawa, Ontario, Canada. Canadian Special Publication of Fisheries and Aquatic Sciences 106.

Wilcox, D. B. 1993. An aquatic habitat classification system for the Upper Mississippi River System. U.S. Fish and Wildlife Service, Environmental Management Technical Center, Onalaska, Wisconsin, May 1993. EMTC 93-T003. 9 pp. + Appendix A (NTIS # PB93-208981)

Wlosinski, J. H., D. E. Hansen, and S. R. Hagedorn. 1995. Long Term Resource Monitoring Program Procedures: Water surface elevation and discharge. National Biological Service, Environmental Management Technical Center, Onalaska, Wisconsin, August 1995. LTRMP 95-P002-4. 9 pp. + Appendixes A–O

U.S. Fish and Wildlife Service. 1993. Operating Plan for the Upper Mississippi River System Long Term Resource Monitoring Program. Environmental Management Technical Center, Onalaska, Wisconsin, Revised September 1993. EMTC 91-P002R. 179 pp. (NTIS #PB94-160199)

Chapter 1. Pool 4, Upper Mississippi River

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Hydrograph

Water levels in the tailwater of Lock and Dam 3 were well above the 30-year average at the beginning of the first and third sampling periods (Figure 1.1). Water levels were similar to 30-year average elevations during much of the second period, when elevations are historically at their lowest. High flows impeded sampling in the MCBW during the first period.

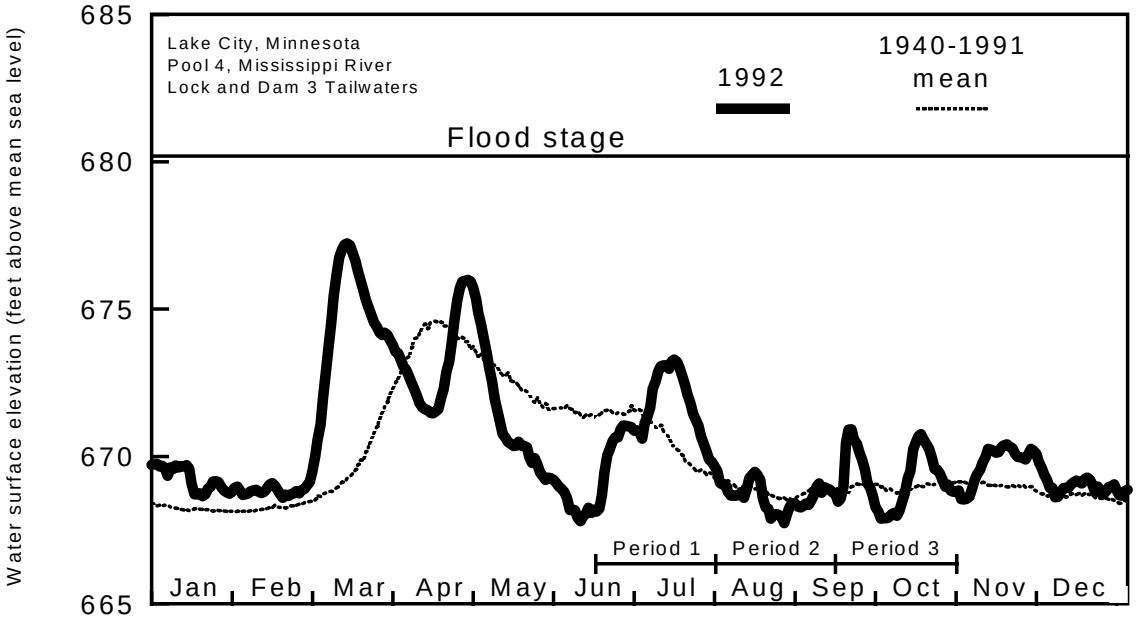

Figure 1.1. Daily water surface elevation from Lock and Dam 3 for Pool 4, Upper Mississippi River, during 1992 and mean elevation since 1940. The U.S. Army Corps of Engineers discharge data were obtained from the Environmental Management Technical Center (Wlosinski et al. 1995).

Summary of Sampling Effort

In 1991, the targeted level of sampling effort was 348 collections. We completed 312 collections in 1991 (Table 1.1). During the first period, 90 of the 116 scheduled collections were completed. High flows curtailed wing dam sampling and electrofishing during the first period. We completed 106 collections during the second period. All 116 allotted collections were completed during the third period in 1991.

Total Catch by Gear

In 1991, 88,866 fish comprising 62 species and two hybrids were collected (Table 1.2). The most abundant species were the emerald shiner (83% of total catch), mimic shiner (3%), bluegill (3%), white bass (1%), and gizzard shad (1%). The majority of the emerald shiner catch (97%) was taken in two mini fyke nets in the TWZ during the second period. Three species (fathead minnow, blacknose dace, and crystal darter) were represented by single specimens. Total catches by gear were by day electrofishing, 2,347; night electrofishing,

3,521; fyke net, 1693; tandem fyke net, 1,159; mini fyke net, 75,375; tandem mini fyke, 491; seine, 3,749; hoop net, 423; and trawl, 108.

Fixed Sampling, Mean *C/f* by Gear and Stratum

Day Electrofishing

We collected 50 species by day electrofishing (Table 1.2). The emerald shiner had the highest *C/f*s (Table 1.3.1) in the BWCO (21/h = 4 × 5.25 per 15-min run), MCBU (109/h), and MCBW (84/h). In the BWCS, the gizzard shad had the highest *C/f* (67/h).

Night Electrofishing

Night electrofishing catches comprised 47 species (Table 1.2). The emerald shiner had the highest *C/f*s (Table 1.3.2) in the MCBU (125/h) and SCB (118/h). In the BWCO, the freshwater drum had the highest *C/f* (27/h); in the TWZ, the white bass had the highest *C/f* (153/h).

Six species were collected exclusively by day and night electrofishing (Table 1.2). These were the chestnut lamprey, silver lamprey, mooneye, quillback, highfin carpsucker, and crystal darter.

Fyke Net

We collected 27 species in fyke nets (Table 1.2). The white bass had the highest *C/f*s (Table 1.3.3) in the MCBW (29/net-day) and TWZ (58/net-day). In the BWCS, the bluegill had the highest *C/f* (11/net-day).

Tandem Fyke Net

We collected 22 species in tandem fyke nets in the BWCO (Table 1.2). The highest *C/f*s (Table 1.3.4) were for the freshwater drum (9/net-day), bluegill (9/net-day), and black crappie (8/net-day).

Mini Fyke Net

We collected 29 species in mini fyke nets (Table 1.2) The emerald shiner had the highest *C/f*s (Table 1.3.5) in the TWZ (12,182/net-day) and MCBW (18/net-day). The highest *C/f* in the BWCS was for the bluegill (18/net-day). High *C/f*s in the TWZ are the result of two large catches of emerald shiners during the second period.

Tandem Mini Fyke Net

Tandem mini fyke nets in the BWCO collected 23 species (Table 1.2). The highest *C/f*s (Table 1.3.6) were for the pugnose minnow (7/net-day), bluegill (3/net-day), and bullhead minnow (2/net-day).

Seine

Seine collections comprised 41 species (Table 1.2). The emerald shiner had the highest *C/f* (Table 1.3.7) in the MCBU (56/haul); the bluegill had the highest *C/f* in the SCB (59/haul). Four species were collected exclusively in the seine; the bigmouth shiner, sand shiner, fathead minnow, and blacknose dace.

Tandem Hoop Net

We collected 18 species in tandem hoop nets during 1991 (Table 1.2). The common carp had the highest *C/f*s (Table 1.3.8) in the MCBW (3/net-day), SCB (1/net-day), and TWZ (6/net-day). In the MCBU, the channel catfish had the highest *C/f* (3/net-day).

Trawl

We collected eight species in the trawl during 1991 (Table 1.2). The highest *C/f*s (Table 1.3.9) among all strata were for channel catfish (1/haul per stratum). Speckled chubs were taken exclusively by this gear in 1991.

Length Distributions of Selected Species

Gizzard Shad

The modal length of 860 gizzard shad collected by electrofishing was 10 cm, and the maximum length was 46 cm (Figure 1.2). The relatively high catch of gizzard shad greater than 20 cm is unusual in Pool 4.

Common Carp

The modal length of 520 common carp collected by electrofishing was 44 cm (Figure 1.3). Common carp ranged in length from 24 to 78 cm.

Channel Catfish

The modal length of 84 channel catfish collected in hoop nets was 18 cm (Figure 1.4). Length of channel catfish from hoop nets ranged from 14 to 70 cm.

White Bass

The length distribution of 415 white bass collected by electrofishing is presented in Figure 1.5. Lengths ranged from 4 to 38 cm, and the modal length was 12 cm.

Bluegill

The modal length of 555 bluegills collected by electrofishing was 10 cm, and the maximum length was 20 cm (Figure 1.6). The 507 bluegills collected in fyke nets ranged in length from 2 to 20 cm, and the modal length was 16 cm (Figure 1.7).

Largemouth Bass

The length distribution of 151 largemouth bass collected by electrofishing is presented in Figure 1.8. Lengths ranged from 6 to 58 cm, and the modal length was 8 cm.

Black Crappie

The lengths of 429 black crappies collected in fyke nets ranged from 4 to 34 cm (Figure 1.9). The modal length was 20 cm.

Sauger

The length distribution of 123 saugers collected by electrofishing is presented in Figure 1.10. Lengths of saugers ranged from 12 to 42 cm, and the modal length was 24 cm.

Walleye

The length distribution of 70 walleyes collected by electrofishing is presented in Figure 1.11. Individuals ranged from 6 to 60 cm in length, and the modal length was 40 cm.

Freshwater Drum

Freshwater drum collected by electrofishing ranged from 10 to 68 cm in length, and the modal length was 24 cm (Figure 1.12). Freshwater drum collected in fyke nets were from 10 to 46 cm in length, and the modal length was 30 cm (Figure 1.13).

Table 1.1. Allocation of fish sampling effort among strata by the Long Term Resource Monitoring Program in Pool 4 of the Mississippi River during 1991. Table entries are numbers of successfully completed standardized monitoring collections.

Sampling period = 1: June 15 - July 31

Sampling gear	BWCS	BWCO	SCB	MCBU	MCBW	IMPS	IMPO	CTR	TWZ	TOTAL
Day electrofishing	6	6		2						14
Fyke net	6								2	8
Tandem hoop net			4	4					2	10
Mini fyke net	6								2	8
Night electrofishing		2	2	2						6
Seine			4	4						8
Trawling				8				12	4	24
Tandem fyke net		6								6
Tandem mini fyke net		6								6
SUBTOTAL	18	20	10	20	0	0	0	12	10	90

Sampling period = 2: August 1 - September 14

Sampling gear	BWCS	BWCO	SCB	MCBU	MCBW	IMPS	IMPO	CTR	TWZ	TOTAL
Day electrofishing	6	6		2	4					18
Fyke net	6				2				2	10
Tandem hoop net			2	4	3				1	10
Mini fyke net	6				2				2	10
Night electrofising		4	4	4					2	14
Seine			4	4						8
Trawling				8				12	4	24
Tandem fyke net		6								6
Tandem mini fyke net		6								6
SUBTOTAL	18	22	10	22	11	0	0	12	11	106

Sampling period = 3: September 15 - October 31

Sampling gear	BWCS	BWCO	SCB	MCBU	MCBW	IMPS	IMPO	CTR	TWZ	TOTAL
Day electrofishing	6	6		4	4					20
Fyke net	6				4				2	12
Tandem hoop net			4	4	4				2	14
Mini fyke net	6				4				2	12
Night electrofishing		4	4	4					2	14
Seine			4	4						8
Trawling				8				12	4	24
Tandem fyke net		6								6
Tandem mini fyke net		6								6
SUBTOTAL	18	22	12	24	16	0	0	12	12	116
	54	64	32	6	27	0	0	36	33	312

Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.
BWCO - Backwater, contiguous, offshore. SCB - Side channel border.
IMPS - Impounded, shoreline. CTR - Main channel trough.
IMPO - Impounded, offshore. TWZ - Tailwater.
MCBU - Main channel border, unstructured.

Table 1.2. Total catches, by gear type, of fishes collected by the Long Term Resource Program during 1991 in Pool 4 of the Mississippi River. See Table 1.1 for the list of sampling gears actually deployed in this study reach.

Species	Common name	Scientific name	D	N	F	X	M	Y	S	H	T	TOTAL
1	Chestnut lamprey	Ichthyomyzon castaneus	1	1	-	-	-	-	-	-	-	2
2	Silver lamprey	Ichthyomyzon unicuspis	1	3	-	-	-	-	-	-	-	4
3	Shovelnose sturgeon	Scaphirhynchus platorynchus	-	-	-	-	-	-	-	1	2	3
4	Longnose gar	Lepisosteus osseus	2	1	2	-	-	-	-	-	-	5
5	Shortnose gar	Lepisosteus platostomus	-	8	5	-	3	-	-	-	-	16
6	Bowfin	Amia calva	6	2	18	5	-	-	-	-	-	31
7	Mooneye	Hiodon tergisus	2	6	-	-	-	-	-	-	-	8
8	American eel	Anguilla rostrata	-	-	-	-	2	-	-	-	-	2
9	Gizzard shad	Dorosoma cepedianum	446	414	34	14	94	3	171	-	-	1176
10	Spotfin shiner	Cyprinella spiloptera	19	24	-	-	73	-	270	-	-	386
11	Common carp	Cyprinus carpio	243	277	95	43	-	1	2	149	2	812
12	Speckle chub	Macrhybopsis aestivalis	-	-	-	-	-	-	-	-	18	18
13	Silver chub	Macrhybopsis storeriana	8	35	-	-	6	-	3	1	4	57
14	Golden shiner	Notemigonus crysoleucas	8	1	-	1	8	-	1	-	-	19
15	Emerald shiner	Notropis atherinoides	593	624	-	-	71240	21	1136	-	-	73614
16	River shiner	Notropis blennius	78	121	-	-	396	-	357	-	-	952
17	Bigmouth shiner	Notropis dorsalis	-	-	-	-	-	-	4	-	-	4
18	Spottail shiner	Notropis hudsonius	24	10	-	-	49	16	89	-	-	188
19	Sand shiner	Notropis stramineus	-	-	-	-	-	-	8	-	-	8
20	Weed shiner	Notropis texanus	2	-	-	-	2	1	2	-	-	7
21	Mimic shiner	Notropis volucellus	2	85	-	-	2738	-	224	-	-	3049
22	Pugnose minnow	Opsopoeodus emiliae	41	2	-	-	221	228	5	-	-	497
23	Fathead minnow	Pimephales promelas	-	-	-	-	-	-	1	-	-	1
24	Bullhead minnow	Pimephales vigilax	31	144	-	-	17	68	145	-	-	405
25	Blacknose dace	Rhinichthys atratulus	-	-	-	-	-	-	1	-	-	1
26	River carpscker	Carpiodes carpio	3	3	-	-	-	-	1	1	-	8
27	Quillback	Carpiodes cyprinus	8	13	-	-	-	-	-	-	-	21
28	Highfin carpsucker	Carpiodes velifer	3	-	-	-	-	-	-	-	-	3
29	White sucker	Catostomus commersoni	5	8	9	2	-	-	-	1	-	25
30	Smallmouth buffalo	Ictiobus bubalus	11	5	7	-	-	-	-	10	-	33
31	Bigmouth buffalo	Ictiobus cyprinellus	1	-	2	-	-	-	-	1	-	4
32	Spotted sucker	Minytrema melanops	30	-	9	2	-	1	-	-	-	42
33	Silver redhorse	Moxostoma anisurum	25	45	121	51	1	-	2	4	-	249
34	River redhorse	Moxostoma carinatum	4	-	2	-	-	-	-	-	-	6
35	Golden redhorse	Moxostoma erythrurum	16	38	8	2	-	-	-	1	-	65
36	Shorthead redhorse	Moxostoma macrolepidotum	48	218	31	2	-	1	16	18	-	334
37	Yellow bullhead	Ameiurus natalis	2	-	-	-	-	-	1	-	-	3
38	Channel catfish	Ictalurus punctatus	1	8	2	-	4	1	1	84	75	176
39	Tadpole madtom	Noturus gyrinus	-	-	-	-	-	2	2	-	-	4
40	Flathead catfis	Pylodictis olivaris	-	8	-	2	-	-	-	12	1	23

Gears: D - Day electrofishing
N - Night electrofishing
F - Fyke netting
M - Mini fyke netting
T - Trawling (4.8-m bottom trawl)
S - Seining
H - Small and large hoop netting
X - Tandem fyke netting
Y - Tandem mini fyke netting

Table 1.2. Total catches, by gear type, of fishes collected by the Long Term Resource Program during 1991 in Pool 4 of the Mississippi River. See Table 1.1 for the list of sampling gears actually deployed in this study reach.

Species	Common name	Scientific name	D	N	F	X	M	Y	S	H	T	TOTAL
41	Northern pike	Esox lucius	5	12	19	4	-	-	5	-	-	45
42	Trout-perch	Percopsis omiscomaycus	1	15	-	-	-	1	3	-	-	20
43	Brook silverside	Labidesthes sicculus	4	10	-	-	1	-	86	-	-	101
44	White bass	Morone chrysops	69	346	535	71	86	9	67	24	-	1207
45	Rock bass	Ambloplites rupestris	10	26	16	13	2	7	8	1	-	83
46	Green sunfish	Lepomis cyanellus	4	22	-	-	6	1	3	-	-	36
47	Pumpkinseed	Lepomis gibbosus	6	1	9	23	1	-	-	-	-	40
48	Bluegill	Lepomis macrochirus	238	317	230	277	356	93	711	37	-	2259
49	Green sunfish x pumpkinsed	L. cyanellus x L. gibbosus	-	1	-	-	-	-	1	-	-	2
50	Pumpkinseed x bluegill	L. gibbosus x L. macrochirus	1	1	-	-	-	-	-	-	-	2
51	Smallmouth bass	Micropterus dolomieu	51	135	1	-	-	1	19	2	-	209
52	Largemouth bass	Micropterus salmoides	86	65	15	1	1	2	25	-	-	195
53	White crappie	Pomoxis annularis	11	4	20	11	24	18	-	-	-	88
54	Black crappie	Pomoxis nigromaculatus	21	26	175	254	8	4	18	19	-	525
55	Crystal darter	Ammocrypta asprella	-	1	-	-	-	-	-	-	-	1
56	Western sand darter	Ammocrypta clara	1	-	-	-	-	-	154	-	-	155
57	Johnny darter	Etheostoma nigrum	1	3	-	-	1	3	36	-	-	44
58	Yellow perch	Perca flavescens	72	23	33	61	3	-	16	-	-	208
59	Logperch	Percina caprodes	33	25	-	-	3	1	104	-	-	166
60	Slenderhead darter	Percina phoxocephala	1	1	-	-	-	-	3	-	-	5
61	River darter	Percina shumardi	-	2	-	-	28	-	45	-	2	77
62	Sauger	Stizostedion canadense	7	116	7	1	1	-	2	3	-	137
63	Walleye	Stizostedion vitreum	15	55	9	1	-	-	1	-	-	81
64	Freshwater drum	Aplodinotus grunniens	46	210	279	318	-	8	-	54	4	919
			2347	3521	1693	1159	75375	491	3749	423	108	88866

Gears: D - Day electrofishing
N - Night electrofishing
F - Fyke netting
M - Mini fyke netting
T - Trawling (4.8-m bottom trawl)
S - Seining
H - Small and large hoop netting
X - Tandem fyke netting
Y - Tandem mini fyke netting

Table 1.3.1. Mean catch-per-unit-effort and (standard error) for fishes collected by using day electrofishing in Pool 4 of the Mississippi River using fixed-site sampling during 1991. See text for definitions of catch-per-unit-effort and standard error.

Common name	BWCO	BWCS	MCBU	MCBW
Chestnut lamprey	0.00	0.00	0.13	0.00
	(0.00)	(0.00)	(0.13)	(0.00)
Silver lamprey	0.00	0.00	0.13	0.00
	(0.00)	(0.00)	(0.13)	(0.00)
Longnose gar	0.00	0.06	0.11	0.00
	(0.00)	(0.06)	(0.11)	(0.00)
Bowfin	0.00	0.28	0.13	0.00
	(0.00)	(0.14)	(0.13)	(0.00)
Mooneye	0.15	0.00	0.00	0.00
	(0.10)	(0.00)	(0.00)	(0.00)
Gizzard shad	4.05	16.69	5.58	5.30
	(1.25)	(5.70)	(1.92)	(2.03)
Spotfin shiner	0.06	0.11	1.05	1.26
	(0.06)	(0.08)	(0.55)	(0.64)
Common carp	0.34	5.21	14.43	3.41
	(0.20)	(2.24)	(5.35)	(1.37)
Silver chub	0.00	0.00	0.75	0.53
	(0.00)	(0.00)	(0.75)	(0.53)
Golden shiner	0.00	0.39	0.00	0.10
	(0.00)	(0.23)	(0.00)	(0.10)
Emerald shiner	5.25	11.91	27.13	20.91
	(1.74)	(4.58)	(12.47)	(16.83)
River shiner	0.00	0.11	9.24	0.00
	(0.00)	(0.08)	(4.36)	(0.00)
Spottail shiner	0.00	1.28	0.00	0.21
	(0.00)	(0.56)	(0.00)	(0.21)
Weed shiner	0.00	0.11	0.00	0.00
	(0.00)	(0.08)	(0.00)	(0.00)
Mimic shiner	0.00	0.08	0.13	0.00
	(0.00)	(0.08)	(0.13)	(0.00)
Pugnose minnow	0.11	2.21	0.00	0.00
	(0.11)	(0.80)	(0.00)	(0.00)
Bullhead minnow	0.00	0.86	0.36	2.64
	(0.00)	(0.37)	(0.18)	(1.62)
River carpsucker	0.00	0.17	0.00	0.00
	(0.00)	(0.12)	(0.00)	(0.00)
Quillback	0.28	0.17	0.00	0.00
	(0.14)	(0.09)	(0.00)	(0.00)
Highfin carpsucker	0.18	0.00	0.00	0.09
	(0.13)	(0.00)	(0.00)	(0.09)
White sucker	0.06	0.22	0.00	0.00
	(0.06)	(0.17)	(0.00)	(0.00)
Smallmouth buffalo	0.17	0.39	0.00	0.40
	(0.17)	(0.16)	(0.00)	(0.31)
Bigmouth buffalo	0.00	0.06	0.00	0.00
	(0.00)	(0.06)	(0.00)	(0.00)
Spotted sucker	0.06	1.65	0.00	0.00
	(0.06)	(0.51)	(0.00)	(0.00)
Silver redhorse	0.51	0.83	0.25	0.27
	(0.26)	(0.23)	(0.25)	(0.27)
River redhorse	0.00	0.00	0.00	0.92
	(0.00)	(0.00)	(0.00)	(0.48)
Golden redhorse	0.14	0.33	0.75	0.42
	(0.10)	(0.16)	(0.41)	(0.42)
Shorthead redhorse	0.08	0.60	0.97	4.61
	(0.08)	(0.24)	(0.25)	(1.47)
Yellow bullhead	0.00	0.11	0.00	0.00
	(0.00)	(0.08)	(0.00)	(0.00)
Channel catfish	0.00	0.06	0.00	0.00
	(0.00)	(0.06)	(0.00)	(0.00)

Strata: BWCS - Backwater, contiguous, shoreline MCBU - Main channel border, unstructured
BWCO - Backwater, contiguous, offshore MCBW - Main channel border, wing dam
IMPS - Impounded, shoreline SCB - Side channel boarder
IMPO - Impounded, offshore CTR - Main channel trough TWZ - Tailwater

Table 1.3.1. Mean catch-per-unit-effort and (standard error) for fishes collected by using day electrofishing in Pool 4 of the Mississippi River using fixed-site sampling during 1991. See text for definitions of catch-per-unit-effort and standard error.

Common name	BWCO	BWCS	MCBU	MCBW
Northern pike	0.08	0.11	0.13	0.10
	(0.08)	(0.08)	(0.13)	(0.10)
Trout perch	0.06	0.00	0.00	0.00
	(0.06)	(0.00)	(0.00)	(0.00)
Brook silverside	0.10	0.17	0.00	0.00
	(0.10)	(0.09)	(0.00)	(0.00)
White bass	0.21	0.67	4.30	4.10
	(0.16)	(0.28)	(0.84)	(2.67)
Rock bass	0.00	0.19	0.69	0.19
	(0.00)	(0.10)	(0.48)	(0.19)
Green sunfish	0.00	0.11	0.13	0.27
	(0.00)	(0.11)	(0.13)	(0.27)
Pumpkinseed	0.00	0.30	0.00	0.10
	(0.00)	(0.14)	(0.00)	(0.10)
Bluegill	0.19	6.23	2.25	11.76
	(0.11)	(1.13)	(0.92)	(8.08)
Pumpkinseed x bluegill	0.00	0.06	0.00	0.00
	(0.00)	(0.06)	(0.00)	(0.00)
Smallmouth bass	0.00	0.17	3.65	2.62
	(0.00)	(0.17)	(1.37)	(0.71)
Largemouth bass	0.11	3.83	1.24	0.92
	(0.08)	(0.65)	(0.32)	(0.73)
White crappie	0.00	0.56	0.00	0.10
	(0.00)	(0.26)	(0.00)	(0.10)
Black crappie	0.00	0.39	1.32	0.29
	(0.00)	(0.18)	(0.41)	(0.21)
Western sand darter	0.00	0.00	0.13	0.00
	(0.00)	(0.00)	(0.13)	(0.00)
Johnny darter	0.00	0.06	0.00	0.00
	(0.00)	(0.06)	(0.00)	(0.00)
Yellow perch	0.14	3.76	0.60	0.00
	(0.10)	(0.83)	(0.41)	(0.00)
Logperch	0.00	0.50	1.97	1.35
	(0.00)	(0.35)	(1.02)	(1.04)
Slenderhead darter	0.00	0.00	0.00	0.19
	(0.00)	(0.00)	(0.00)	(0.19)
Sauger	0.24	0.11	0.00	0.27
	(0.24)	(0.11)	(0.00)	(0.27)
Walleye	0.00	0.56	0.58	0.00
	(0.00)	(0.35)	(0.34)	(0.00)
Freshwater drum	0.86	1.13	0.11	1.43
	(0.66)	(0.33)	(0.11)	(0.78)

Strata: BWCS - Backwater, contiguous, shoreline
BWCO - Backwater, contiguous, offshore
IMPS - Impounded, shoreline
IMPO - Impounded, offshore
MCBU - Main channel border, unstructured
MCBW - Main channel border, wing dam
SCB - Side channel boarder
CTR - Main channel trough
TWZ - Tailwater

Table 1.3.2. Mean catch-per-unit-effort and (standard error) for fishes collected by using night electrofishing in Pool 4 of the Mississippi River using fixed-site smpling during 1991. See text for definitions of catch-per-unit-effort and standard error.

Common name	BWCO	MCBU	SCB	TWZ
Chestnut lamprey	0.00	0.10	0.00	0.00
	(0.00)	(0.10)	(0.00)	(0.00)
Silver lamprey	0.00	0.00	0.13	0.45
	(0.00)	(0.00)	(0.13)	(0.26)
Longnose gar	0.00	0.10	0.00	0.00
	(0.00)	(0.10)	(0.00)	(0.00)
Shortnose gar	0.00	0.20	0.10	1.20
	(0.00)	(0.20)	(0.10)	(0.64)
Bowfin	0.00	0.10	0.00	0.20
	(0.00)	(0.10)	(0.00)	(0.20)
Mooneye	0.20	0.30	0.10	0.00
	(0.13)	(0.30)	(0.10)	(0.00)
Gizzard shad	4.07	19.70	13.80	11.23
	(1.58)	(5.10)	(8.52)	(4.93)
Spotfin shiner	0.00	1.20	1.03	0.50
	(0.00)	(1.09)	(0.45)	(0.50)
Common carp	0.10	11.50	9.08	15.89
	(0.10)	(4.64)	(3.16)	(5.03)
Silver chub	0.20	1.40	1.88	0.25
	(0.20)	(0.88)	(0.86)	(0.25)
Golden shiner	0.00	0.10	0.00	0.00
	(0.00)	(0.10)	(0.00)	(0.00)
Emerald shiner	1.57	31.17	29.55	1.39
	(0.56)	(12.03)	(8.73)	(0.94)
River shiner	0.00	11.40	0.70	0.00
	(0.00)	(9.04)	(0.37)	(0.00)
Spottail shiner	0.00	0.40	0.68	0.00
	(0.00)	(0.31)	(0.45)	(0.00)
Mimic shiner	0.00	4.20	4.88	0.00
	(0.00)	(3.98)	(1.97)	(0.00)
Pugnose minnow	0.00	0.00	0.20	0.00
	(0.00)	(0.00)	(0.20)	(0.00)
Bullhead minnow	0.00	2.41	11.60	1.34
	(0.00)	(1.22)	(5.57)	(0.78)
River carpsucker	0.00	0.10	0.10	0.25
	(0.00)	(0.10)	(0.10)	(0.25)
Quillback	0.24	0.73	0.40	0.00
	(0.16)	(0.43)	(0.16)	(0.00)
White sucker	0.00	0.00	0.80	0.00
	(0.00)	(0.00)	(0.29)	(0.00)
Smallmouth buffalo	0.00	0.20	0.20	0.20
	(0.00)	(0.13)	(0.13)	(0.20)
Silver redhorse	0.20	1.67	2.73	0.00
	(0.13)	(0.53)	(1.03)	(0.00)
Golden redhorse	0.10	1.20	1.50	2.50
	(0.10)	(0.81)	(0.78)	(2.18)
Shorthead redhorse	0.30	11.99	7.20	7.00
	(0.21)	(3.26)	(1.64)	(3.85)
Channel catfish	0.00	0.40	0.30	0.25
	(0.00)	(0.31)	(0.21)	(0.25)
Flathead catfish	0.00	0.30	0.10	0.89
	(0.00)	(0.21)	(0.10)	(0.33)
Northern pike	0.00	0.20	1.03	0.00
	(0.00)	(0.13)	(0.47)	(0.00)
Trout perch	0.00	0.21	1.43	0.00
	(0.00)	(0.14)	(0.67)	(0.00)
Brook silverside	0.00	0.20	0.80	0.00
	(0.00)	(0.13)	(0.59)	(0.00)
White bass	0.40	13.35	6.03	38.35
	(0.40)	(3.99)	(3.07)	(12.74)

Strata: BWCS - Backwater, contiguous, shoreline MCBU - Main channel border, unstructured
BWCO - Backwater, contiguous, offshore MCBW - Main channel border, wing dam
IMPS - Impounded, shoreline SCB - Side channel boarder
IMPO - Impounded, offshore CTR - Main channel trough TWZ - Tailwater

Table 1.3.2. Mean catch-per-unit-effort and (standard error) for fishes collected by using night electrofishing in Pool 4 of the Mississippi River using fixed-site sampling during 1991. See text for definitions of catch-per-unit-effort and standard error.

Common name	BWCO	MCBU	SCB	TWZ
Rock bass	0.00	1.41	1.25	0.00
	(0.00)	(0.65)	(0.53)	(0.00)
Green sunfish	0.00	0.10	0.20	4.11
	(0.00)	(0.10)	(0.13)	(1.97)
Pumpkinseed	0.00	0.00	0.00	0.25
	(0.00)	(0.00)	(0.00)	(0.25)
Bluegill	0.20	5.34	11.50	31.01
	(0.13)	(2.83)	(4.39)	(18.68)
Green sunfish x pumpkinseed	0.00	0.00	0.00	0.20
	(0.00)	(0.00)	(0.00)	(0.20)
Pumpkinseed x bluegill	0.00	0.00	0.00	0.20
	(0.00)	(0.00)	(0.00)	(0.20)
Smallmouth bass	0.00	4.95	1.73	16.42
	(0.00)	(1.33)	(0.82)	(1.89)
Largemouth bass	0.00	0.30	6.23	0.00
	(0.00)	(0.15)	(2.99)	(0.00)
White crappie	0.10	0.10	0.00	0.50
	(0.10)	(0.10)	(0.00)	(0.50)
Black crappie	0.00	0.80	1.20	1.39
	(0.00)	(0.39)	(0.39)	(0.48)
Crystal darter	0.00	0.10	0.00	0.00
	(0.00)	(0.10)	(0.00)	(0.00)
Johnny darter	0.00	0.00	0.30	0.00
	(0.00)	(0.00)	(0.30)	(0.00)
Yellow perch	0.00	0.30	2.25	0.00
	(0.00)	(0.30)	(0.90)	(0.00)
Logperch	0.00	0.54	1.00	2.07
	(0.00)	(0.41)	(0.52)	(1.48)
Slenderhead darter	0.00	0.00	0.00	0.20
	(0.00)	(0.00)	(0.00)	(0.20)
River darter	0.00	0.00	0.10	0.20
	(0.00)	(0.00)	(0.10)	(0.20)
Sauger	0.00	3.48	1.20	17.75
	(0.00)	(0.85)	(0.44)	(9.97)
Walleye	0.10	1.66	0.80	7.75
	(0.10)	(0.55)	(0.29)	(4.27)
Freshwater drum	6.70	2.14	1.40	26.79
	(3.29)	(1.27)	(0.52)	(12.46)

Strata: BWCS - Backwater, contiguous, shoreline
BWCO - Backwater, contiguous, offshore
IMPS - Impounded, shoreline
IMPO - Impounded, offshore
MCBU - Main channel border, unstructured
MCBW - Main channel border, wing dam
SCB - Side channel boarder
CTR - Main channel trough
TWZ - Tailwater

Table 1.3.3. Mean catch-per-unit-effort and (standard error) for fishes collected by using fyke netting in Poo 4 of the Mississippi River using fixed-site sampling during 1991. See text for definitions of catch-per-unit-effort and standard error.

Common name	BWCS	MCBW	TWZ
Longnose gar	0.07	0.00	0.19
	(0.07)	(0.00)	(0.19)
Shortnose gar	0.00	0.17	0.74
	(0.00)	(0.17)	(0.55)
Bowfin	0.97	0.00	0.00
	(0.39)	(0.00)	(0.00)
Gizzard shad	1.55	0.51	0.55
	(0.62)	(0.35)	(0.38)
Common carp	5.20	0.33	0.73
	(1.46)	(0.33)	(0.55)
White sucker	0.45	0.00	0.19
	(0.19)	(0.00)	(0.19)
Smallmouth buffalo	0.41	0.00	0.00
	(0.17)	(0.00)	(0.00)
Bigmouth buffalo	0.10	0.00	0.00
	(0.07)	(0.00)	(0.00)
Spotted sucker	0.51	0.00	0.00
	(0.19)	(0.00)	(0.00)
Silver redhorse	6.89	0.00	0.00
	(1.62)	(0.00)	(0.00)
River redhorse	0.00	0.34	0.00
	(0.00)	(0.21)	(0.00)
Golden redhorse	0.17	0.00	0.89
	(0.09)	(0.00)	(0.70)
Shorthead redhorse	1.19	1.19	0.53
	(0.34)	(1.19)	(0.37)
Channel catfish	0.14	0.00	0.00
	(0.14)	(0.00)	(0.00)
Northern pike	0.98	0.00	0.19
	(0.34)	(0.00)	(0.19)
White bass	2.74	29.07	57.68
	(0.89)	(28.28)	(31.40)
Rock bass	0.89	0.00	0.00
	(0.28)	(0.00)	(0.00)
Pumpkinseed	0.45	0.00	0.19
	(0.19)	(0.00)	(0.19)
Bluegill	11.17	1.56	4.39
	(3.05)	(1.05)	(2.41)
Smallmouth bass	0.00	0.00	0.19
	(0.00)	(0.00)	(0.19)
Largemouth bass	0.66	0.17	0.36
	(0.41)	(0.17)	(0.36)
White crappie	0.22	0.52	2.46
	(0.13)	(0.23)	(2.24)
Black crappie	6.20	2.92	8.75
	(2.07)	(2.13)	(4.91)
Yellow perch	1.84	0.00	0.00
	(0.57)	(0.00)	(0.00)
Sauger	0.11	0.33	0.55
	(0.08)	(0.33)	(0.25)
Walleye	0.50	0.00	0.00
	(0.24)	(0.00)	(0.00)
Freshwater drum	0.51	19.86	28.47
	(0.15)	(18.28)	(22.94)

Strata: BWCS - Backwater, contiguous, shoreline
BWCO - Backwater, contiguous, offshore
IMPS - Impounded, shoreline
IMPO - Impounded, offshore
MCBU - Main channel border, unstructured
MCBW - Main channel border, wing dam
SCB - Side channel boarder
CTR - Main channel trough
TWZ - Tailwater

Table 1.3.4. Mean catch-per-unit-effort and (standard error) for fishes collected by using tandem fyke netting in Pool 4 of the Mississippi River using fixed-site sampling during 1991. See text for definitions of catch-per-unit-effort and standard error.

Common name	BWCO
Bowfin	0.15
	(0.07)
Gizzard shad	0.44
	(0.24)
Common carp	1.34
	(0.41)
Golden shiner	0.03
	(0.03)
White sucker	0.06
	(0.06)
Spotted sucker	0.06
	(0.04)
Silver redhorse	1.59
	(0.70)
Golden redhorse	0.06
	(0.04)
Shorthead redhorse	0.06
	(0.04)
Flathead catfish	0.06
	(0.04)
Northern pike	0.12
	(0.06)
White bass	2.10
	(0.81)
Rock bass	0.41
	(0.14)
Pumpkinseed	0.69
	(0.38)
Bluegill	8.58
	(2.38)
Largemouth bass	0.03
	(0.03)
White crappie	0.33
	(0.15)
Black crappie	8.08
	(2.47)
Yellow perch	1.91
	(0.59)
Sauger	0.03
	(0.03)
Walleye	0.03
	(0.03)
Freshwater drum	9.55
	(3.17)

Strata: BWCS - Backwater, contiguous, shoreline
BWCO - Backwater, contiguous, offshore
IMPS - Impounded, shoreline
IMPO - Impounded, offshore
MCBU - Main channel border, unstructured
MCBW - Main channel border, wing dam
SCB - Side channel boarder
CTR - Main channel trough
TWZ - Tailwater

Table 1.3.5. Mean catch-per-unit-effort and (standard error) for fishes collected by using mini fyke netting in Pool 4 of the Mississippi River using fixed-site sampling during 1991. See text for definitions of catch-per-unit-effort and standard error.

Common name	BWCS	MCBW	TWZ
Shortnose gar	0.00	0.50	0.00
	(0.00)	(0.50)	(0.00)
American eel	0.00	0.19	0.17
	(0.00)	(0.19)	(0.17)
Gizzard shad	5.82	0.20	0.00
	(3.91)	(0.20)	(0.00)
Spotfin shiner	0.06	1.96	10.54
	(0.06)	(1.96)	(10.54)
Silver chub	0.00	0.00	1.12
	(0.00)	(0.00)	(0.71)
Golden shiner	0.00	1.57	0.00
	(0.00)	(1.57)	(0.00)
Emerald shiner	3.90	18.82	12182.2
	(1.37)	(18.82)	(9652.23)
River shiner	0.00	0.20	70.04
	(0.00)	(0.20)	(70.04)
Spottail shiner	0.30	2.75	5.15
	(0.16)	(2.75)	(4.93)
Weed shiner	0.13	0.00	0.00
	(0.09)	(0.00)	(0.00)
Mimic shiner	0.11	1.37	482.99
	(0.11)	(1.37)	(456.62)
Pugnose minnow	11.70	0.00	0.00
	(6.25)	(0.00)	(0.00)
Bullhead minnow	0.84	0.00	0.36
	(0.44)	(0.00)	(0.23)
Silver redhorse	0.06	0.00	0.00
	(0.06)	(0.00)	(0.00)
Channel catfish	0.00	0.78	0.00
	(0.00)	(0.78)	(0.00)
Brook silverside	0.05	0.00	0.00
	(0.05)	(0.00)	(0.00)
White bass	2.09	1.28	8.58
	(1.35)	(0.84)	(8.18)
Rock bass	0.11	0.00	0.00
	(0.11)	(0.00)	(0.00)
Green sunfish	0.32	0.00	0.00
	(0.19)	(0.00)	(0.00)
Pumpkinseed	0.07	0.00	0.00
	(0.07)	(0.00)	(0.00)
Bluegill	18.20	0.20	0.36
	(8.14)	(0.20)	(0.23)
Largemouth bass	0.06	0.00	0.00
	(0.06)	(0.00)	(0.00)
White crappie	1.15	0.39	0.00
	(0.54)	(0.39)	(0.00)
Black crappie	0.45	0.00	0.00
	(0.22)	(0.00)	(0.00)
Johnny darter	0.06	0.00	0.00
	(0.06)	(0.00)	(0.00)
Yellow perch	0.20	0.00	0.00
	(0.15)	(0.00)	(0.00)
Logperch	0.17	0.00	0.00
	(0.09)	(0.00)	(0.00)
River darter	0.00	0.00	4.96
	(0.00)	(0.00)	(4.96)
Sauger	0.00	0.00	0.19
	(0.00)	(0.00)	(0.19)

Strata: BWCS - Backwater, contiguous, shoreline
BWCO - Backwater, contiguous, offshore
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IMPO - Impounded, offshore
MCBU - Main channel border, unstructured
MCBW - Main channel border, wing dam
SCB - Side channel boarder
CTR - Main channel trough
TWZ - Tailwater

Table 1.3.6. Mean catch-per-unit-effort and (standard error) for fishes collected by using tandem mini fyke netting in Pool 4 of the Mississippi River using fixed-site sampling during 1991. See text for definitions of catch-per-unit-effort and standard error.

Common name	BWCO
Gizzard shad	0.08
	(0.06)
Common carp	0.03
	(0.03)
Emerald shiner	0.66
	(0.32)
Spottail shiner	0.53
	(0.32)
Weed shiner	0.03
	(0.03)
Pugnose minnow	6.98
	(4.15)
Bullhead minnow	2.05
	(0.84)
Spotted sucker	0.03
	(0.03)
Shorthead redhorse	0.04
	(0.04)
Channel catfish	0.03
	(0.03)
Tadpole madtom	0.06
	(0.04)
Trout perch	0.03
	(0.03)
White bass	0.27
	(0.14)
Rock bass	0.22
	(0.10)
Green sunfish	0.03
	(0.03)
Bluegill	2.97
	(1.15)
Smallmouth bass	0.03
	(0.03)
Largemouth bass	0.06
	(0.04)
White crappie	0.49
	(0.34)
Black cappie	0.14
	(0.11)
Johnny darter	0.09
	(0.05)
Logperch	0.03
	(0.03)
Freshwater drum	0.22
	(0.11)

Strata: BWCS - Backwater, contiguous, shoreline
BWCO - Backwater, contiguous, offshore
IMPS - Impounded, shoreline
IMPO - Impounded, offshore
MCBU - Main channel border, unstructured
MCBW - Main channel border, wing dam
SCB - Side channel boarder
CTR - Main channel trough
TWZ - Tailwater

Table 1.3.7. Mean catch-per-unit-effort and (standard error) for fishes collected by using tandem hoop netting in Pool 4 of the Mississippi River using fixed-site sampling during 1991. See text for definitions of catch-per-unit-effort and standard error.

Common name	MCBU	MCBW	SCB	TWZ
Shovelnose sturgeon	0.00	0.00	0.00	0.10
	(0.00)	(0.00)	(0.00)	(0.10)
Common carp	1.31	2.63	1.45	5.63
	(0.70)	(1.26)	(0.84)	(4.53)
Silver chub	0.04	0.00	0.00	0.00
	(0.04)	(0.00)	(0.00)	(0.00)
River carpsucker	0.04	0.00	0.00	0.00
	(0.04)	(0.00)	(0.00)	(0.00)
White sucker	0.04	0.00	0.00	0.00
	(0.04)	(0.00)	(0.00)	(0.00)
Smallmouth buffalo	0.13	0.07	0.27	0.10
	(0.07)	(0.07)	(0.12)	(0.10)
Bigmouth buffalo	0.00	0.07	0.00	0.00
	(0.00)	(0.07)	(0.00)	(0.00)
Silver redhorse	0.04	0.00	0.10	0.10
	(0.04)	(0.00)	(0.10)	(0.10)
Golden redhorse	0.00	0.00	0.00	0.10
	(0.00)	(0.00)	(0.00)	(0.10)
Shorthead redhorse	0.31	0.14	0.37	0.20
	(0.15)	(0.09)	(0.21)	(0.20)
Channel catfish	3.09	0.29	0.26	0.41
	(1.34)	(0.22)	(0.12)	(0.19)
Flathead catfish	0.38	0.00	0.10	0.10
	(0.27)	(0.00)	(0.10)	(0.10)
White bass	0.13	0.07	0.05	1.94
	(0.10)	(0.07)	(0.05)	(1.94)
Rock bass	0.04	0.00	0.00	0.00
	(0.04)	(0.00)	(0.00)	(0.00)
Bluegill	0.39	0.73	0.89	0.10
	(0.30)	(0.41)	(0.67)	(0.10)
Smallmouth bass	0.04	0.00	0.00	0.10
	(0.04)	(0.00)	(0.00)	(0.10)
Black crappie	0.17	0.37	0.46	0.10
	(0.13)	(0.29)	(0.22)	(0.10)
Sauger	0.00	0.07	0.00	0.20
	(0.00)	(0.07)	(0.00)	(0.20)
Freshwater drum	0.56	1.32	0.53	1.33
	(0.27)	(0.63)	(0.29)	(0.38)

Strata: BWCS - Backwater, contiguous, shoreline
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SCB - Side channel boarder
CTR - Main channel trough
TWZ - Tailwater

Table 1.3.8. Mean catch-per-unit-effort and (standard error) for fishes collected by using seining in Pool 4 of the Mississippi River using fixed-site sampling during 1991. See text for definitions of catch-per-unit-effort and standard error.

Common name	MCBU	SCB
Gizzard shad	11.67	2.58
	(7.37)	(0.95)
Spotfin shiner	3.92	18.58
	(1.54)	(7.32)
Common carp	0.00	0.17
	(0.00)	(0.11)
Silver chub	0.17	0.08
	(0.17)	(0.08)
Golden shiner	0.00	0.08
	(0.00)	(0.08)
Emerald shiner	55.83	38.83
	(34.57)	(23.30)
River shiner	14.67	15.08
	(7.01)	(7.10)
Bigmouth shiner	0.17	0.17
	(0.11)	(0.17)
Spottail shiner	1.00	6.42
	(0.46)	(5.36)
Sand shiner	0.17	0.50
	(0.17)	(0.34)
Weed shiner	0.00	0.17
	(0.00)	(0.17)
Mimic shiner	8.92	9.75
	(4.99)	(5.63)
Pugnose minnow	0.00	0.42
	(0.00)	(0.23)
Fathead minnow	0.00	0.08
	(0.00)	(0.08)
Bullhead minnow	2.00	10.08
	(0.72)	(4.09)
Blacknose dace	0.00	0.08
	(0.00)	(0.08)
River carpsucker	0.00	0.08
	(0.00)	(0.08)
Silver redhorse	0.08	0.08
	(0.08)	(0.08)
Shorthead redhorse	0.00	1.33
	(0.00)	(0.74)
Yellow bullhead	0.00	0.08
	(0.00)	(0.08)
Channel catfish	0.08	0.00
	(0.08)	(0.00)
Tadpole madtom	0.00	0.17
	(0.00)	(0.17)
Northern pike	0.00	0.42
	(0.00)	(0.19)
Trout perch	0.08	0.17
	(0.08)	(0.11)
Brook silverside	0.08	7.08
	(0.08)	(4.30)
White bass	2.17	3.42
	(1.22)	(1.71)
Rock bass	0.00	0.67
	(0.00)	(0.47)
Green sunfish	0.00	0.25
	(0.00)	(0.25)
Bluegill	0.33	58.92
	(0.19)	(49.07)
Green sunfish x pumpkinseed	0.00	0.08
	(0.00)	(0.08)

Strata: BWCS - Backwater, contiguous, shoreline
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IMPO - Impounded, offshore
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MCBW - Main channel border, wing dam
SCB - Side channel boarder
CTR - Main channel trough
TWZ - Tailwater

Table 1.3.8. Mean catch-per-unit-effort and (standard error) for fishes collected by using seining in Pool 4 of the Mississippi River using fixed-site sampling during 1991. See text for definitions of catch-per-unit-effort and standard error.

Common name	MCBU	SCB
Smallmouth bass	1.00	0.58
	(0.51)	(0.26)
Largemouth bass	0.08	2.00
	(0.08)	(0.56)
Black crappie	0.00	1.50
	(0.00)	(0.81)
Western sand darter	12.83	0.00
	(10.96)	(0.00)
Johnny darter	0.17	2.83
	(0.11)	(1.77)
Yellow perch	0.00	1.33
	(0.00)	(0.86)
Logperch	3.17	5.50
	(2.18)	(2.68)
Slenderhead darter	0.00	0.25
	(0.00)	(0.18)
River darter	2.08	1.67
	(1.16)	(0.89)
Sauger	0.08	0.08
	(0.08)	(0.08)
Walleye	0.00	0.08
	(0.00)	(0.08)

Strata: BWCS - Backwater, contiguous, shoreline
BWCO - Backwater, contiguous, offshore
IMPS - Impounded, shoreline
IMPO - Impounded, offshore
MCBU - Main channel border, unstructured
MCBW - Main channel border, wing dam
SCB - Side channel boarder
CTR - Main channel trough
TWZ - Tailwater

Table 1.3.9. Mean catch-per-unit-effort and (standard error) for fishes collected by using bottom trawling in Pool 4 of the Mississippi River using fixed-site sampling during 1991. See text for definitions of catch-per-unit-effort and standard error.

Common name	MCBU	TWZ
Shovelnose sturgeon	0.00	0.17
	(0.00)	(0.11)
Common carp	0.00	0.17
	(0.00)	(0.11)
Speckled chub	0.04	0.92
	(0.04)	(0.65)
Silver chub	0.04	0.08
	(0.04)	(0.08)
Channel catfish	0.83	1.50
	(0.28)	(0.73)
Flathead catfish	0.04	0.00
	(0.04)	(0.00)
River darter	0.00	0.17
	(0.00)	(0.17)
Freshwater drum	0.08	0.08
	(0.06)	(0.08)

Strata: BWCS - Backwater, contiguous, shoreline
BWCO - Backwater, contiguous, offshore
IMPS - Impounded, shoreline
IMPO - Impounded, offshore
MCBU - Main channel border, unstructured
MCBW - Main channel border, wing dam
CB - Side channel boarder
CTR - Main channel trough
TWZ - Tailwater

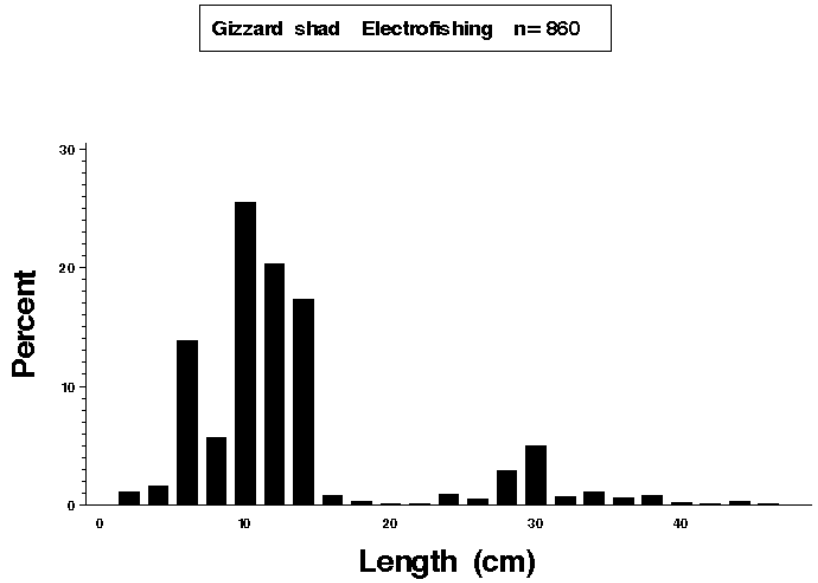

Figure 1.2. Length distributions (*length*) as a percentage of catch (*percent*) for gizzard shad (*Dorosoma cepedianum*) collected by electrofishing in Upper Mississippi River Pool 4 during 1991.

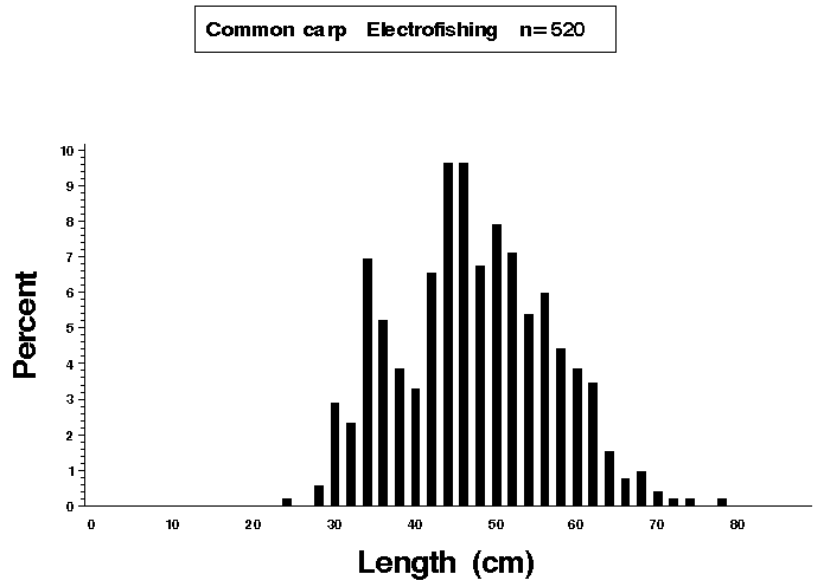

Figure 1.3. Length distributions (*length*) as a percentage of catch (*percent*) for common carp (*Cyprinus carpio*) collected by electrofishing in Upper Mississippi River Pool 4 during1991.

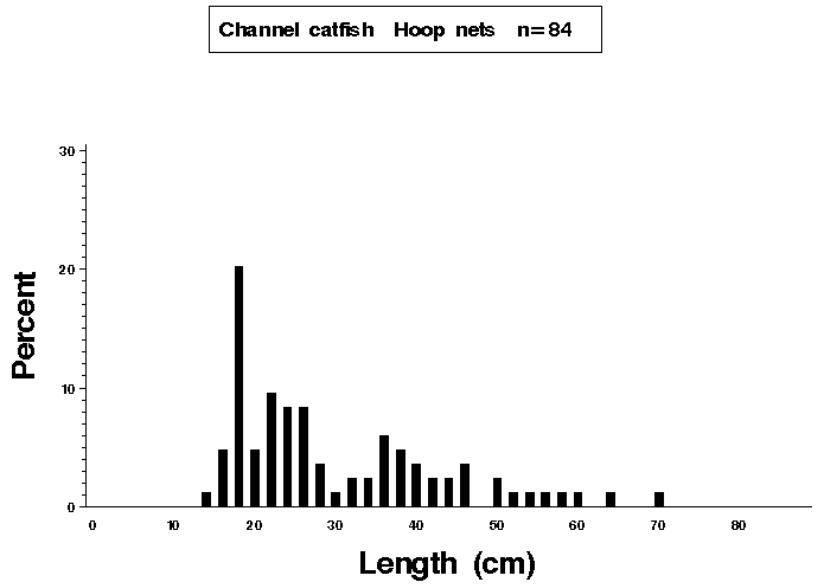

Figure 1.4. Length distributions (*length*) as a percentage of catch (*percent*) for channel catfish (*Ictalurus punctatus*) collected by large and small hoop netting in Upper Mississippi River Pool 4 during 1991.

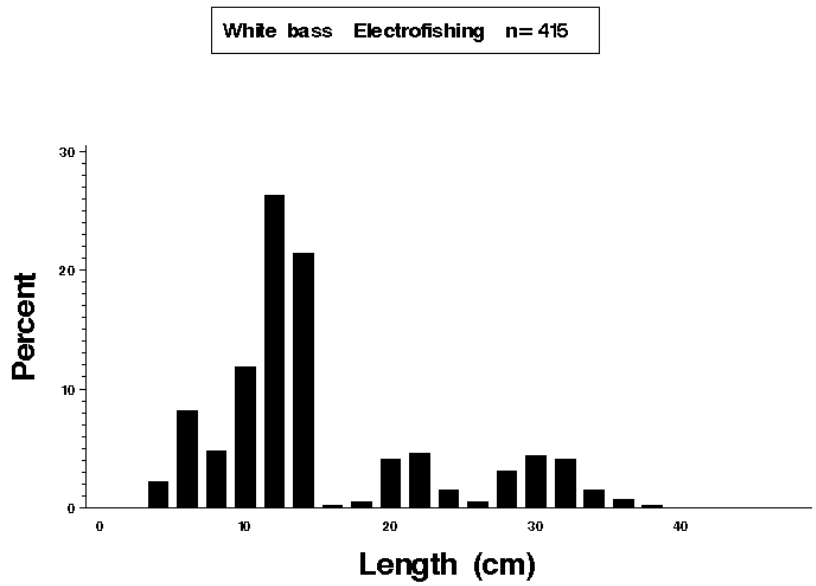

Figure 1.5. Length distributions (*length*) as a percentage of catch (*percent*) for white bass (*Morone chrysops*) collected by electrofishing in Upper Mississippi River Pool 4 during 1991.

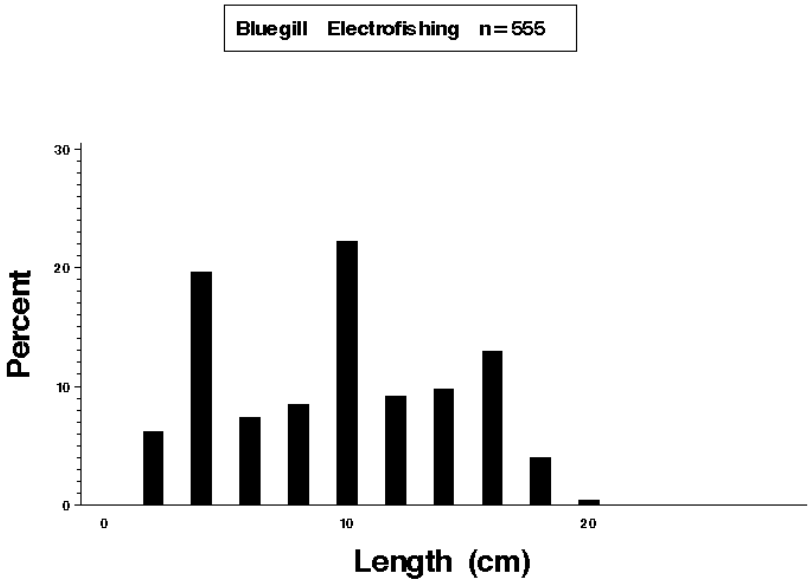

Figure 1.6. Length distributions (*length*) as a percentage of catch (*percent*) for bluegill (*Lepomis macrochirus*) collected by electrofishing in Upper Mississippi River Pool 4 during 1991.

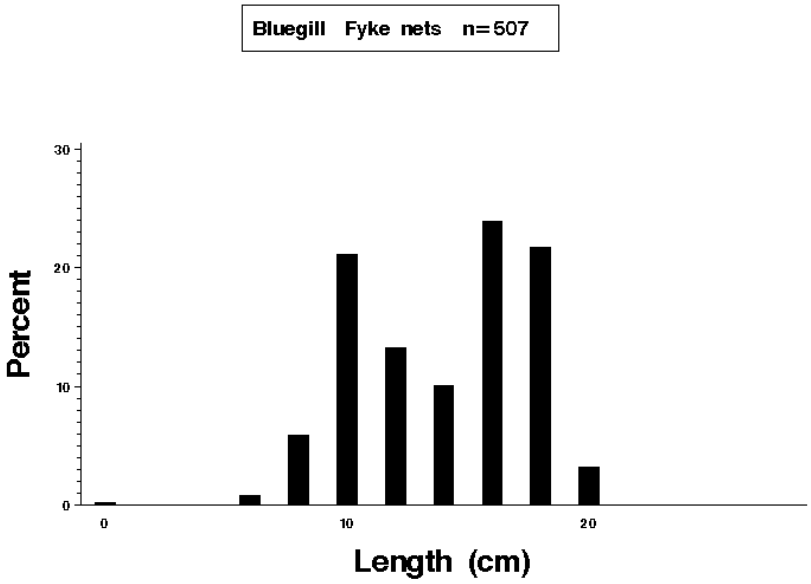

Figure 1.7. Length distributions (*length*) as a percentage of catch (*percent*) for bluegill (*Lepomis macrochirus*) collected by fyke netting in Upper Mississippi River Pool 4 during 1991.

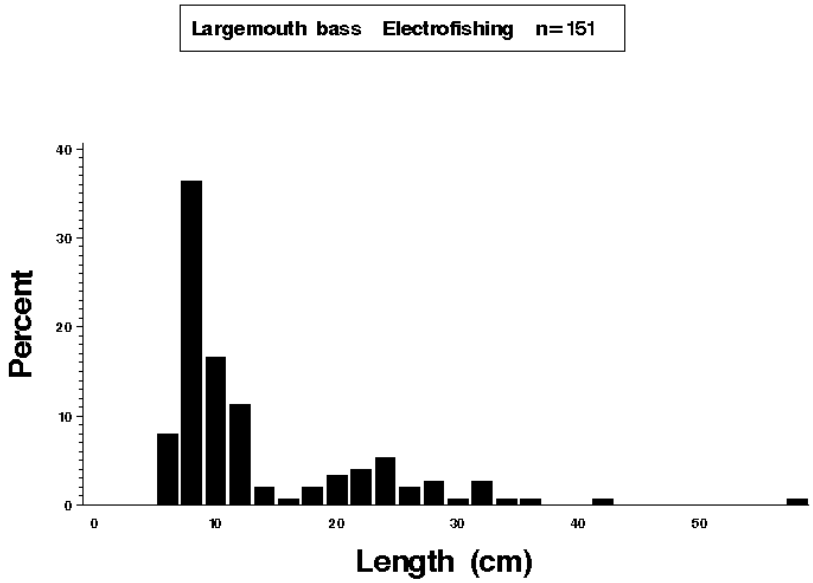

Figure 1.8. Length distributions (*length*) as a percentage of catch (*percent*) for largemouth bass (*Micropterus salmoides*) collected by electrofishing in Upper Mississippi River Pool 4 during 1991.

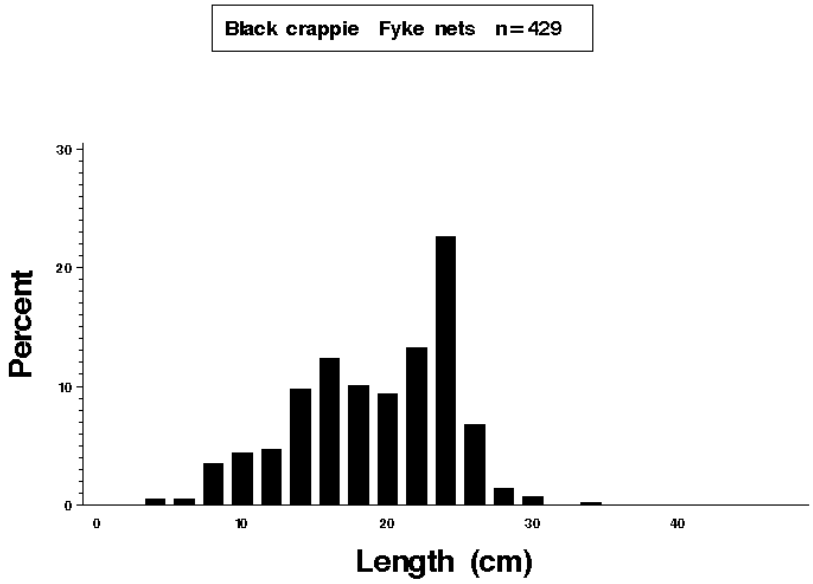

Figure 1.9. Length distributions (*length*) as a percentage of catch (*percent*) for black crappie (*Pomoxis nigromaculatus*) collected by electrofishing in Upper Mississippi River Pool 4 during 1991.

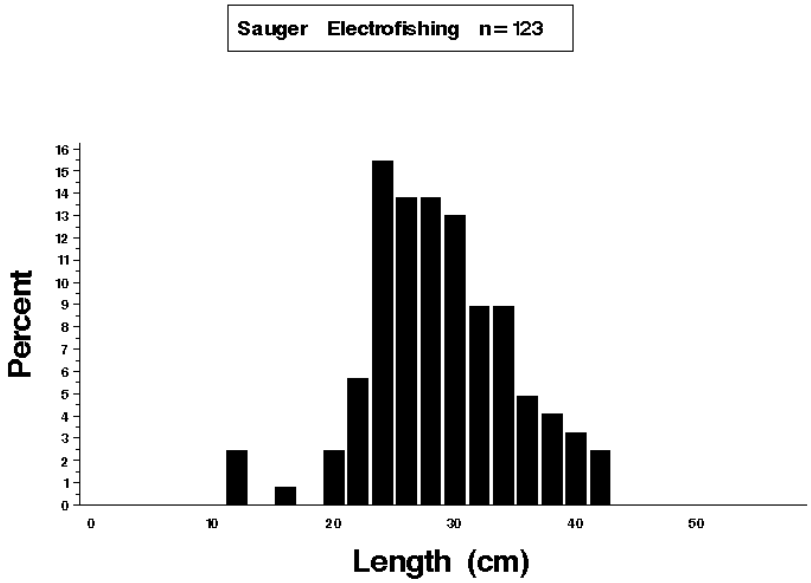

Figure 1.10. Length distributions (*length*) as a percentage of catch (*percent*) for sauger (*Stizostedion canadense*) collected by electrofishing in Upper Mississippi River Pool 4 during 1991.

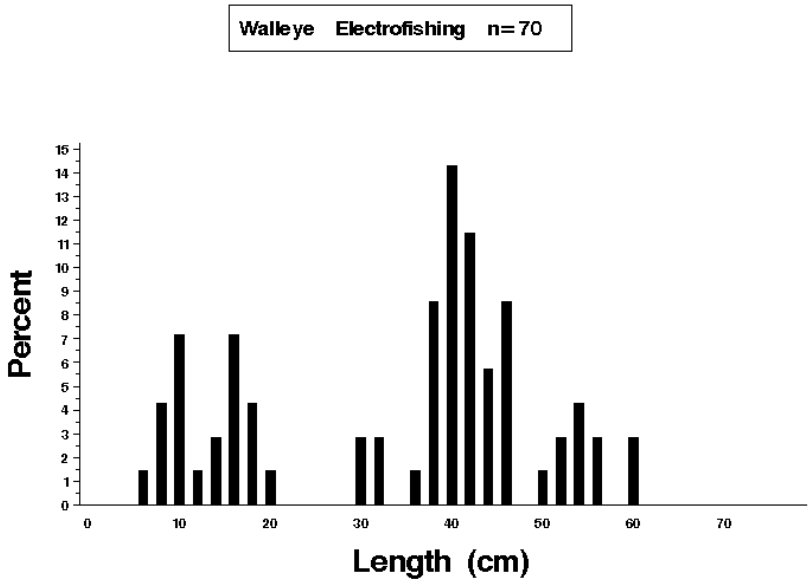

Figure 1.11. Length distributions (*length*) as a percentage of catch (*percent*) for walleye (*Stizostedion vitreum*) collected by electrofishing in Upper Mississippi River Pool 4 during 1991.

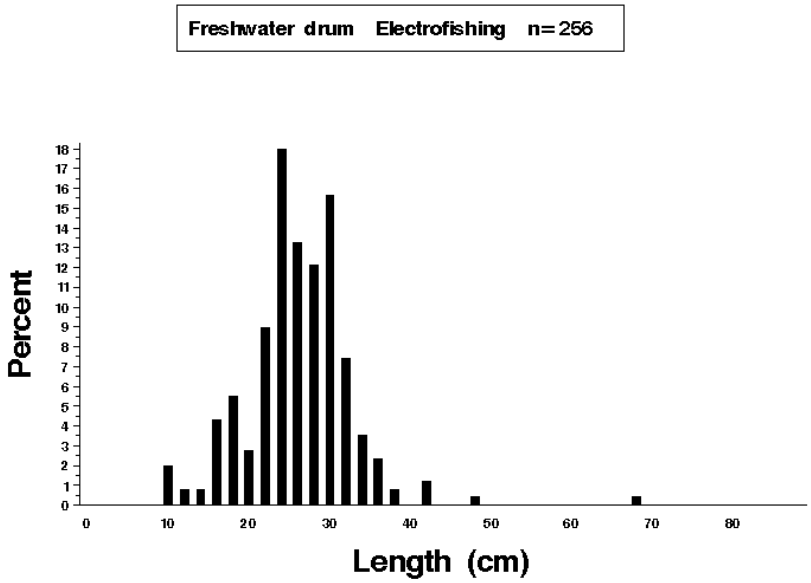

Figure 1.12. Length distributions (*length*) as a percentage of catch (*percent*) for freshwater drum (*Aplodinotus grunniens*) collected by electrofishing in Upper Mississippi River Pool 4 during 1991.

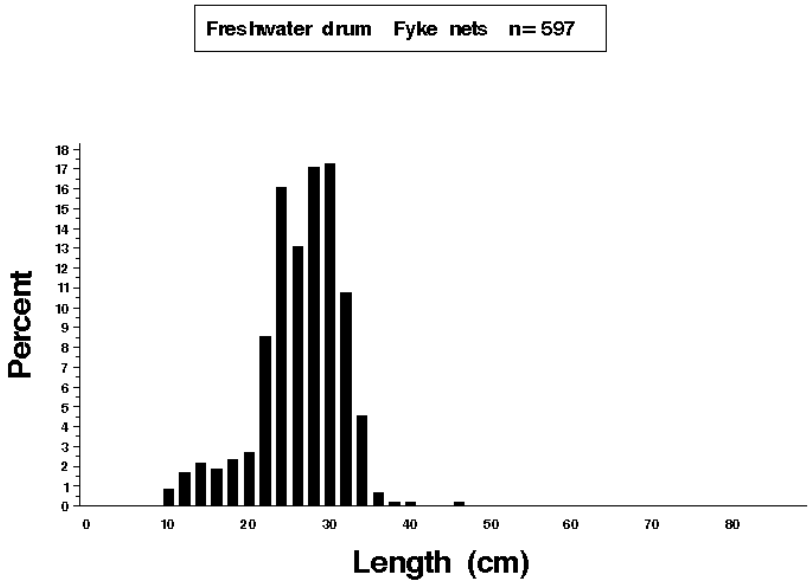

Figure 1.13. Length distributions (*length*) as a percentage of catch (*percent*) for freshwater drum (*Aplodinotus grunniens*) collected by fyke netting in Upper Mississippi River Pool 4 during 1991.

Chapter 2. Pool 8, Upper Mississippi River

by

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Hydrograph

The 1991 hydrograph for Pool 8 (Figure 2.1) indicated relatively low water levels for the months of January through mid-March and levels higher than the historical mean for most of the rest of the year. The river did not reach flood stage in Pool 8 during 1991 but crested slightly below the flood mark in May and again in June. A surge of high water in late September may have influenced fish catches but did not deter sampling in 1991.

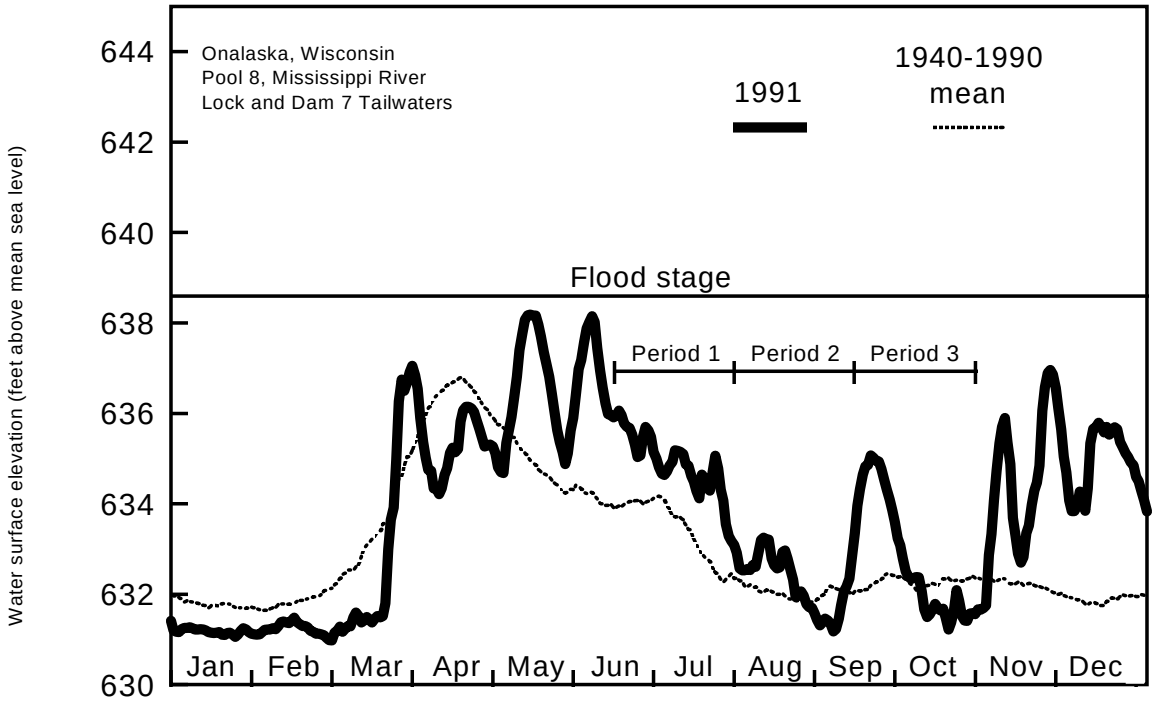

Figure 2.1. Daily water surface elevation from Lock and Dam 7 for Pool 8, Upper Mississippi River, during 1991 and mean elevation since 1940. The U.S. Army Corps of Engineers discharge data were obtained from the Environmental Management Technical Center (Wlosinski et al. 1995).

Summary of Sampling Effort

We made 390 fish collections in Pool 8 during 1991. Gear allocations across strata remained somewhat consistent for all three sampling periods (Table 2.1) except that tandem hoop netting in the MCBW sites was increased from four collections per period to six collections per period for periods 2 and 3. Also, 2-day electrofishing collections were made in the TWZ for period 2 that were not part of the normal gear allocation. All of the collections were from fixed sites in the BWCS, IMPO, IMPS, MCBU, MCBW, SCB, CTR, and TWZ strata. The MCBW, BWCS, and MCBU strata received the most sampling effort.

Total Catch by Gear

We collected 23,981 fish representing 68 species and five hybrid crosses in 1991 (Table 2.2). Of this total, 140 fish <30 mm long were identified only to family or genus. The five most abundant species in our samples were bluegill (4,734), emerald shiner (2,056), spotfin shiner (1,590), bullhead minnow (1,468), and gizzard shad (1,443). Total species (excluding hybrids) collected, by gear type, were day electrofishing (52), night electrofishing (54), fyke netting (41), tandem fyke netting (12), mini fyke netting (47), tandem mini fyke netting (7), seining (32), tandem hoop netting (21), and trawling (14). Fish distribution records for the Upper Mississippi River (Pitlo et al. 1995) document 99 fish species from Pool 8. Our species total before the 1991 season was 63. Seven new species—American eel, black bullhead, creek chub, central mudminnow, river darter, trout-perch, and yellow bass—were added in 1991, bringing the cumulative total to 70. In 1991, we collected eight pallid shiners, which are on Wisconsin's endangered list. We also collected 1 speckled chub and 110 river redhorse in 1991, both listed as threatened species in Wisconsin.

Fixed Sampling, Mean *C/f* by Gear and Stratum

Day Electrofishing

For day electrofishing (Table 2.3.1) in the BWCS stratum, bluegill (41.82) were the most abundant fish. Emerald shiner were most abundant in the IMPO (11.82), IMPS (3.66), and MCB (6.96) strata. Gizzard shad were most abundant in the MCBW (6.78) and TWZ (45.88) strata.

Night Electrofishing

For night electrofishing (Table 2.3.2), bluegill (58.73) had the highest *C/f* in the BWCS stratum. White bass were most abundant in the MCBU (12.41) stratum, shorthead redhorse (6.72) in the MCBW stratum, emerald shiner (20.64) in the SCB stratum, and sauger (28.27) in the TWZ stratum.

Fyke Net

Fyke nets were deployed at fixed sites in four strata (Table 2.3.3). Bluegill had the highest *C/f*s in the BWCS (50.84), MCBW (5.07), and TWZ (9.31) strata. White bass (5.18) were most abundant in the IMPS stratum.

Tandem Fyke Net

Tandem fyke netting was conducted at one fixed site in the IMPO stratum (Table 2.3.4) in 1991. Freshwater drum (1.53) had the highest mean *C/f*.

Mini Fyke Net

Bluegill (61.81) dominated the BWCS *C/f* for mini fyke nets (Table 2.3.5). White bass (6.76) were most abundant for mini fyke nets in the IMPS stratum. Spotfin shiner (40.04) had the highest *C/f* in the MCBW stratum, and emerald shiner (22.04) had the highest *C/f* in the TWZ stratum.

Tandem Mini Fyke Net

Tandem mini fyke netting was conducted only in the IMPO stratum (Table 2.3.6). White bass (2.66) had the highest *C/f*.

Tandem Hoop Net

For tandem hoop nets (Table 2.3.7), channel catfish had the highest *C/f*s in the MCBU (9.71) and SCB (7.54) strata. Common carp (1.19) were most abundant in the MCBW stratum. Smallmouth buffalo (4.71) were most abundant in the TWZ stratum.

Seine

For seining (Table 2.3.8), bullhead minnow (10.75) had the highest *C/f* in the BWCS stratum. In the MCBU stratum, emerald shiner (42.67) were most abundant, and in the SCB stratum Mississippi silvery minnow (26.83) had the highest *C/f*.

Trawl

Trawling was conducted at fixed sites in three strata (Table 2.3.9). Freshwater drum had the highest mean *C/f* in the MCBU (2.67) and CTR (0.69) strata, and channel catfish (3.67) were most abundant in the TWZ stratum.

Length Distributions of Selected Species

Length distributions are presented for selected species in Figures 2.2 to 2.19. The length distributions presented may be limited by the size selectiveness of the particular gear. Care should be used when trying to interpret length distributions from samples smaller than 100 (Anderson and Neumann 1996); they are presented in this report because of local interest in the species by river managers.

Gizzard Shad

Most gizzard shad collected by electrofishing in Pool 8 during 1991 were between 10 and 20 cm long (Figure 2.2). Sample size was 1,231 fish.

Common Carp

The electrofishing length distribution of 387 common carp (Figure 2.3) showed a large group of fish from 40 to 62 cm long, with relatively few fish outside this range. There were no common carp less than 38 cm long in the catch.

Smallmouth Buffalo

Smallmouth buffalo collected by electrofishing showed a different picture from those collected in hoop nets. The 39 smallmouth buffalo collected by electrofishing (Figure 2.4) fell into two size ranges, from 10 to 18 cm long and from 32 to 46 cm long. All of the 229 smallmouth buffalo collected in tandem hoop nets (Figure 2.5) in 1991 were greater than 30 cm long, with the largest concentration of fish measuring about 40 cm long.

Channel Catfish

The sample of 114 channel catfish collected by electrofishing indicated a bimodal size structure for channel catfish in Pool 8 (Figure 2.6). The length ranges of channel catfish most often collected by electrofishing were 6–8 and 16–20 cm. The length distribution of 460 channel catfish collected in hoop nets (Figure 2.7) was unimodal, with most of the fish from 16 to 36 cm and few fish longer than 40 cm.

Northern Pike

The 1991 northern pike length distribution, represented as 32 fish collected by electrofishing (Figure 2.8), showed a group of small fish from 10 to 20 cm long and a larger group from 42 to 84 cm long. The length distribution for 40 northern pike collected by fyke netting (Figure 2.9) showed a smaller range of lengths from 50 to 90 cm long and one fish at 22 cm.

White Bass

The most abundant length group from the 842 white bass we collected by electrofishing in 1991 (Figure 2.10) was 10 cm. Although few fish longer than 15 cm were collected, the complete length range for white bass was 2 to 40 cm.

Bluegill

We collected 2,352 bluegills by electrofishing in 1991 (Figure 2.11). The electrofishing distribution was broadly represented by fish from 2 to 18 cm long. The 1,415 bluegills collected in fyke nets (Figure 2.12) showed a similar distribution to the electrofishing catch, except that juveniles less than 8 cm long were not effectively sampled by the fyke nets. The most abundant length for electrofishing was 4 and 10 cm for fyke nets.

Largemouth Bass

The electrofishing length distribution from 980 largemouth bass (Figure 2.13) showed many small fish and a well-defined bimodal distribution, with modes at 4 and 28 cm. Less than 10% of the catch exceeded 35 cm in length.

White Crappie

The sample for white crappie collected in fyke nets consisted of 82 fish. The length distribution for white crappie (Figure 2.14) was nearly bell-shaped, with the most abundant length at 20 cm.

Black Crappie

We collected 655 black crappie in fyke nets in 1991 (Figure 2.15). Most of the fish collected were from 12 to 26 cm long, with few extremely large or small fish present.

Sauger

The sample size for sauger collected by electrofishing in 1991 was 414. The length distribution (Figure 2.16) was unimodal, with the most abundant group at 16 cm. Few sauger greater than 30 cm long were collected.

Walleye

We collected 264 walleye during 1991 by electrofishing. The length distribution for walleye (Table 2.17) was bimodal, with the largest groups of fish at 18 and 44 cm. About 25% of the catch was longer than 40 cm.

Freshwater Drum

The length distribution for freshwater drum collected by electrofishing represents 523 fish (Figure 2.18). Aside from a large group of fish at 10–14 cm, the rest of catch was evenly represented by 1–5% in each size range up to 46 cm. The 109 freshwater drum collected in fyke nets (Figure 2.19) showed a major group from 12 to 30 cm long.

Table 2.1. Allocation of fish sampling effort among strata by the Long Term Resource Monitoring Program in Pool 8 of the Mississippi River during 1991. Table entries are numbers of successfully completed standardized monitoring collections.

Sampling period = 1: June 15 - July 31

Sampling gear	BWCS	BWCO	SCB	MCBU	MCBW	IMPS	IMPO	CTR	TWZ	TOTAL
Day electrofishing	8			4	6	2	2			22
Fyke net	8				6	2			2	18
Tandem hoop net			4	4	4				2	14
Mini fyke net	4				6	2			2	14
Night electrofishing	4		4	4	6				2	20
Seine	4		4	4						12
Trawling				8				12	4	24
Tandem fyke net							2			2
Tandem mini fyke net							2			2
SUBTOTAL	28	0	12	24	28	6	6	12	12	128

Sampling period = 2: August 1 - September 14

Sampling gear	BWCS	BWCO	SCB	MCBU	MCBW	IMPS	IMPO	CTR	WZ	TOTAL
Day electrofishing	8			4	6	2	2		2	24
Fyke net	8				6	2			2	18
Tandem hoop net			4	4	6				2	16
Mini fyke net	4				6	2			2	14
Night electrofishing	4		4	4	6				2	20
Seine	4		4	4						12
Trawling				8				12	4	24
Tandem fyke net							2			2
Tandem mini fyke net							2			2
SUBTOTAL	28	0	12	24	30	6	6	12	14	132

Sampling period = 3: September 15 - October 31

Sampling gear	BWCS	BWCO	SCB	MCBU	MCBW	IMPS	IMPO	CTR	TWZ	TOTAL
Day electrofishing	8			4	6	2	2			22
Fyke net	8				6	2			2	18
Tandem hoop net			4	4	6				2	16
Mini fyke net	4				6	2			2	14
Night electrofishing	4		4	4	6				2	20
Seine	4		4	4						12
Trawling				8				12	4	24
Tandem fyke net							2			2
Tandem mini fyke net							2			2
SUBTOTAL	28	0	12	24	30	6	6	12	12	130
	84	0	36	72	88	18	18	36	38	390

Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.
BWCO - Backwater, contiguous, offshore. SCB - Side channel border.
IMPS - Impounded, shoreline. CTR - Main channel trough.
IMPO - Impounded, offshore. TWZ - Tailwater.
MCBU - Main channel border, unstructured.

Table 2.2. Total catches, by gear type, of fishes collected by the Long Term Resource Program during 1991 in Pool 8 of the Mississippi River. See Table 2.1 for the list of sampling gears actually deployed in this study reach.

Species	Common name	Scientific name	D	N	F	X	M	Y	S	H	T	TOTAL
1	Chestnut lamprey	Ichthyomyzon castaneus	4	5	-	-	-	-	-	-	-	9
2	Silver lamprey	Ichthyomyzon unicuspis	1	5	1	-	1	-	-	-	-	8
3	Shovelnose sturgeon	Scaphirhynchus platorynchus	-	-	-	-	-	-	-	-	14	14
4	Longnose gar	Lepisosteus osseus	5	28	24	-	5	-	1	4	-	67
5	Shortnose gar	Lepisosteus platostomus	6	15	36	1	-	-	-	2	-	60
6	Bowfin	Amia calva	9	3	84	-	2	-	-	1	-	99
7	Mooneye	Hiodon tergisus	7	67	2	-	-	-	-	-	7	83
8	American eel	Anguilla rostrata	-	-	-	2	-	-	-	-	-	2
9	Gizzard shad	Dorosoma cepedianum	633	598	116	2	17	1	74	-	2	1443
10	Spotfin shiner	Cyprinella spiloptera	211	189	16	-	768	1	405	-	-	1590
11	Common carp	Cyprinus carpio	180	207	66	1	2	-	-	124	5	585
12	Mississippi silvery minnow	Hybognathus nuchalis	-	4	-	-	1	-	322	-	-	327
13	Speckled chub	Macrhybopsis aestivalis	-	-	-	-	-	-	-	-	1	1
14	Silver chub	Macrhybopsis storeriana	-	37	-	-	-	-	-	6	2	45
15	Golden shiner	Notemigonus crysoleucas	3	-	12	-	30	-	3	-	-	48
16	Pallid shiner	Notropis amnis	4	1	-	-	-	-	3	-	-	8
17	Emerald shiner	Notropis atherinoides	325	710	-	-	210	1	810	-	-	2056
18	River shiner	Notropis blennius	58	112	-	-	22	-	255	-	-	447
19	Spottail shiner	Notropis hudsonius	49	68	-	-	67	-	64	-	-	248
20	Weed shiner	Notropis texanus	-	-	-	-	2	-	-	-	-	2
21	Mimic shiner	Notropis volucellus	1	101	-	-	16	-	73	-	-	191
22	Pugnose minnow	Opsopoeodus emiliae	32	19	1	-	54	-	62	-	-	168
23	Fathead minnow	Pimephales promelas	-	-	-	-	1	-	-	-	-	1
24	Bullhead minnow	Pimephales vigilax	238	546	26	-	350	1	307	-	-	1468
25	Creek chub	Semotilus atromaculatus	-	-	-	-	2	-	-	-	-	2
26	Unidentified minnow	Unidentified Cyprinidae	-	1	-	-	-	-	-	-	-	1
27	River carpsucker	Carpiodes carpio	-	12	2	-	-	-	-	-	-	14
28	Quillback	Carpiodes cyprinus	24	151	3	-	-	-	7	-	3	188
29	Highfin carpsucker	Carpiodes velifer	-	4	-	-	-	-	-	-	-	4
30	White sucker	Catostomus commersoni	-	-	3	-	-	-	-	-	-	3
31	Smallmouth buffalo	Ictiobus bubalus	14	25	9	-	-	-	-	230	-	278
32	Bigmouth buffalo	Ictiobus cyprinellus	5	3	3	-	1	-	-	-	-	12
33	Spotted sucker	Minytrema melanops	104	44	28	-	-	-	2	-	-	178
34	Silver redhorse	Moxostoma anisurum	176	479	113	14	4	-	2	217	-	1005
35	River redhorse	Moxostoma carinatum	44	66	-	-	-	-	-	-	-	110
36	Golden redhorse	Moxostoma erythrurum	51	89	6	1	-	-	-	4	-	151
37	Shorthead redhorse	Moxostoma macrolepidotum	236	506	78	7	6	-	7	149	1	990
38	Unidentified redhorse	Moxostoma sp.	-	-	-	-	-	-	2	-	-	2
39	Black bullhead	Ameiurus melas	-	-	1	-	-	-	-	-	-	1
40	Yellow bullhead	Ameiurus natalis	1	-	20	-	1	-	-	-	-	22

Gears: D - Day electrofishing
N - Night electrofishing
F - Fyke netting
M - Mini fyke netting
T - Trawling (4.8-m bottom trawl)
S - Seining
H - Small and large hoop netting
X - Tandem fyke netting
Y - Tandem mini fyke netting

Table 2.2. Total catches, by gear type, of fishes collected by the Long Term Resource Program during 1991 in Pool 8 of the Mississippi River. See Table 2.1 for the list of sampling gears actually deployed in this study reach.

Species	Common name	Scientific name	D	N	F	X	M	Y	S	H	T	TOTAL
41	Brown bullhead	Ameiurus nebulosus	-	-	1	-	-	-	-	-	-	1
42	Channel catfish	Ictalurus punctatus	11	103	13	-	6	14	7	460	63	677
43	Tadpole madtom	Noturus gyrinus	1	1	-	-	1	-	2	-	-	5
44	Flathead catfish	Pylodictis olivaris	2	18	6	1	2	-	-	14	3	46
45	Northern pike	Esox lucius	17	15	40	-	-	-	-	1	-	73
46	Central mudminnow	Umbra limi	-	-	-	-	1	-	-	-	-	1
47	Trout-perch	Percopsis omiscomaycus	-	9	-	-	1	-	-	-	-	10
48	Brook silverside	Labidesthes sicculus	17	150	-	-	9	-	126	-	-	302
49	White bass	Morone chrysops	77	765	167	16	67	32	51	11	14	1200
50	Yellow bass	Morone mississippiensis	2	8	1	-	-	-	-	-	-	11
51	Rock bass	Ambloplites rupestris	12	27	1	-	2	-	3	1	-	46
52	Green sunfish	Lepomis cyanellus	16	14	2	-	1	-	-	-	-	33
53	Pumpkinseed	Lepomis gibbosus	18	11	12	-	2	-	-	-	-	43
54	Warmouth	Lepomis gulosus	8	-	8	-	1	-	-	-	-	17
55	Orangespotted sunfish	Lepomis humilis	12	16	1	-	7	-	2	-	-	38
56	Bluegill	Lepomis macrochirus	1221	1131	1415	-	836	-	87	44	-	4734
57	Green sunfish x pumpkinseed	L. cyanellus x L. gibbosus	1	-	-	-	-	-	-	-	-	1
58	Green sunfish x warmouth	L. cyanellus x L. gulosus	2	1	-	-	-	-	-	-	-	3
59	Green sunfish x bluegill	L. cyanellus x L. macrochirus	1	-	1	-	-	-	-	-	-	2
60	Pumpkinseed x bluegill	L. gibbosus x L. macrochirus	1	-	1	-	-	-	-	-	-	2
61	Warmouth x bluegill	L. gulosus x L. macrochirus	1	-	-	-	-	-	-	-	-	1
62	Unidentified Lepomis	Lepomis sp.	-	2	-	-	14	-	23	-	-	39
63	Smallmouth bass	Micropterus dolomieu	62	131	-	-	-	-	7	5	-	205
64	Largemouth bass	Micropterus salmoides	581	400	15	-	34	-	56	-	-	1086
65	White crappie	Pomoxis annularis	14	9	82	-	5	-	-	10	-	120
66	Black crappie	Pomoxis nigromaculatus	95	98	654	1	188	-	15	47	-	1098
67	Unidentified sunfish	Unidentified Centrarchidae	-	-	-	-	97	-	-	-	-	97
68	Western sand darter	Ammocrypta clara	-	1	-	-	1	-	25	-	-	27
69	Mud darter	Etheostoma asprigene	3	7	-	-	16	-	5	-	-	31
70	Johnny darter	Etheostoma nigrum	16	16	-	-	13	-	28	-	-	73
71	Yellow perch	Perca flavescens	26	16	8	-	5	-	4	-	-	59
72	Logperch	Percina caprodes	96	28	-	-	84	-	24	-	-	232
73	Slenderhead darter	Percina phoxocephala	2	5	-	-	3	-	-	-	-	10
74	River darter	Percina shumardi	1	-	-	-	3	-	-	-	-	4
75	Sauger	Stizostedion canadense	11	403	6	2	1	-	-	1	1	425
76	Walleye	Stizostedion vitreum	53	212	6	-	3	-	-	3	1	278
77	Freshwater drum	Aplodinotus grunniens	72	451	90	19	7	21	35	203	121	1019
78	Larval fish	Unidentified	-	1	-	-	-	-	-	-	-	1
			4873	8144	3180	67	2972	71	2899	1537	238	23981

Gears: D - Day electrofishing
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Table 2.3.1. Mean catch-per-unit-effort and (standard error) for fishes collected by using day electrofishing in Pool 8 of the Mississippi River using fixed-site sampling during 1991. See text for definitions of catch-per-unit-effort and standard error.

Common name	BWCS	IMPO	IMPS	MCBU	MCBW	TWZ
Chestnut lamprey	0.08	0.00	0.00	0.08	0.02	0.00
	(0.05)	(0.00)	(0.00)	(0.08)	(0.02)	(0.00)
Silver lamprey	0.03	0.00	0.00	0.00	0.00	0.00
	(0.03)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Longnose gar	0.00	0.00	0.00	0.08	0.11	0.00
	(0.00)	(0.00)	(0.00)	(0.08)	(0.07)	(0.00)
Shortnose gar	0.00	0.00	0.15	0.07	0.10	0.00
	(0.00)	(0.00)	(0.15)	(0.07)	(0.08)	(0.00)
Bowfin	0.25	0.00	0.15	0.00	0.03	0.00
	(0.10)	(0.00)	(0.15)	(0.00)	(0.03)	(0.00)
Mooneye	0.00	0.16	0.17	0.00	0.16	0.00
	(0.00)	(0.16)	(0.17)	(0.00)	(0.09)	(0.00)
Gizzard shad	8.85	2.54	2.58	4.55	6.78	45.88
	(2.79)	(0.96)	(1.58)	(2.40)	(6.15)	(10.51)
Spotfin shiner	6.95	0.00	0.47	1.14	0.00	0.34
	(2.68)	(0.00)	(0.47)	(0.60)	(0.00)	(0.34)
Common carp	3.61	0.00	0.88	2.94	0.90	2.56
	(0.94)	(0.00)	(0.53)	(0.66)	(0.32)	(1.20)
Golden shiner	0.10	0.00	0.00	0.00	0.00	0.00
	(0.07)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Pallid shiner	0.15	0.00	0.00	0.00	0.00	0.00
	(0.10)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Emerald shiner	2.27	11.82	3.66	6.96	2.53	1.09
	(0.70)	(11.64)	(1.85)	(1.80)	(0.81)	(0.41)
River shiner	0.20	0.00	0.14	3.34	0.27	0.34
	(0.11)	(0.00)	(0.14)	(1.10)	(0.18)	(0.34)
Spottail shiner	1.57	0.00	0.14	0.15	0.04	0.72
	(0.57)	(0.00)	(0.14)	(0.15)	(0.04)	(0.04)
Mimic shiner	0.00	0.00	0.00	0.08	0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.08)	(0.00)	(0.00)
Pugnose minnow	1.18	0.00	0.00	0.00	0.00	0.38
	(0.53)	(0.00)	(0.00)	(0.00)	(0.00)	(0.38)
Bullhead minnow	7.60	0.00	0.31	1.10	0.08	4.67
	(2.60)	(0.00)	(0.31)	(0.55)	(0.05)	(0.59)
Quillback	0.25	0.33	0.14	0.64	0.23	0.00
	(0.10)	(0.21)	(0.14)	(0.32)	(0.10)	(0.00)
Smallmouth buffalo	0.27	0.00	0.14	0.16	0.02	0.68
	(0.11)	(0.00)	(0.14)	(0.11)	(0.02)	(0.68)
Bigmouth buffalo	0.12	0.00	0.00	0.00	0.05	0.00
	(0.09)	(0.00)	(0.00)	(0.00)	(0.04)	(0.00)
Spotted sucker	3.54	0.00	0.00	0.00	0.03	0.38
	(0.86)	(0.00)	(0.00)	(0.00)	(0.03)	(0.38)
Silver redhorse	2.78	2.15	1.03	0.70	1.93	2.56
	(0.76)	(0.57)	(0.71)	(0.29)	(0.40)	(1.20)
River redhorse	0.08	0.16	0.00	0.00	1.30	0.00
	(0.05)	(0.16)	(0.00)	(0.00)	(0.29)	(0.00)
Golden redhorse	0.55	0.00	0.00	0.15	0.97	0.68
	(0.16)	(0.00)	(0.00)	(0.10)	(0.27)	(0.68)
Shorthead redhorse	1.58	0.85	1.12	0.30	5.37	0.00
	(0.37)	(0.31)	(0.67)	(0.17)	(1.02)	(0.00)
Yellow bullhead	0.04	0.00	0.00	0.00	0.00	0.00
	(0.04)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Channel catfish	0.07	0.00	0.45	0.33	0.05	0.00
	(0.05)	(0.00)	(0.30)	(0.19)	(0.04)	(0.00)
Tadpole madtom	0.04	0.00	0.00	0.00	0.00	0.00
	(0.04)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Flathead catfish	0.03	0.17	0.00	0.00	0.00	0.00
	(0.03)	(0.17)	(0.00)	(0.00)	(0.00)	(0.00)
Northern pike	0.57	0.00	0.00	0.00	0.00	0.38
	(0.13)	(0.00)	(0.00)	(0.00)	(0.00)	(0.38)

Strata: BWCS - Backwater, contiguous, shoreline MCBU - Main channel border, unstructured
BWCO - Backwater, contiguous, offshore MCBW - Main channel border, wing dam
IMPS - Impounded, shoreline SCB - Side channel boarder
IMPO - Impounded, offshore CTR - Main channel trough TWZ - Tailwater

Table 2.3.1. Mean catch-per-unit-effort and (standard error) for fishes collected by using day electrofishing in Pool 8 of the Mississippi River using fixed-site sampling during 1991. See text for definitions of catch-per-unit-effort and standard error.

Common name	BWCS	IMPO	IMPS	MCBU	MCBW	TWZ
Brook silverside	0.51	0.00	0.14	0.08	0.02	0.00
	(0.22)	(0.00)	(0.14)	(0.08)	(0.02)	(0.00)
White bass	0.66	0.00	2.88	2.40	0.25	0.38
	(0.20)	(0.00)	(0.79)	(0.72)	(0.11)	(0.38)
Yellow bass	0.06	0.00	0.00	0.00	0.00	0.00
	(0.04)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Rock bass	0.40	0.00	0.00	0.00	0.00	0.34
	(0.20)	(0.00)	(0.00)	(0.00)	(0.00)	(0.34)
Green sunfish	0.48	0.00	0.00	0.00	0.00	0.68
	(0.15)	(0.00)	(0.00)	(0.00)	(0.00)	(0.68)
Pumpkinseed	0.67	0.00	0.00	0.00	0.00	0.00
	(0.44)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Warmouth	0.26	0.00	0.00	0.00	0.00	0.00
	(0.16)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Orangespotted sunfish	0.42	0.00	0.00	0.00	0.00	0.00
	(0.24)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Bluegill	41.82	0.00	0.16	0.56	0.12	2.79
	(10.94)	(0.00)	(0.16)	(0.27)	(0.06)	(1.29)
Green sunfish x pumpkinseed	0.03	0.00	0.00	0.00	0.00	0.00
	(0.03)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Green sunfish x warmouth	0.07	0.00	0.00	0.00	0.00	0.00
	(0.05)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Green sunfish x bluegill	0.04	0.00	0.00	0.00	0.00	0.00
	(0.04)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Pumpkinseed x bluegill	0.04	0.00	0.00	0.00	0.00	0.00
	(0.04)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Warmouth x bluegill	0.04	0.00	0.00	0.00	0.00	0.00
	(0.04)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Smallmouth bass	0.29	0.00	0.14	0.56	1.35	1.06
	(0.10)	(0.00)	(0.14)	(0.25)	(0.35)	(0.30)
Largemouth bass	19.65	0.00	0.30	0.48	0.30	4.56
	(5.22)	(0.00)	(0.19)	(0.19)	(0.16)	(1.56)
White crappie	0.45	0.00	0.00	0.00	0.00	0.00
	(0.16)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Black crappie	3.19	0.00	0.00	0.24	0.00	0.34
	(0.88)	(0.00)	(0.00)	(0.12)	(0.00)	(0.34)
Mud darter	0.03	0.00	0.00	0.08	0.03	0.00
	(0.03)	(0.00)	(0.00)	(0.08)	(0.03)	(0.00)
Johnny darter	0.48	0.00	0.00	0.00	0.00	1.09
	(0.25)	(0.00)	(0.00)	(0.00)	(0.00)	(0.41)
Yellow perch	0.82	0.00	0.00	0.07	0.02	0.00
	(0.30)	(0.00)	(0.00)	(0.07)	(0.02)	(0.00)
Logperch	1.43	0.00	0.00	0.08	0.10	17.29
	(0.54)	(0.00)	(0.00)	(0.08)	(0.05)	(11.28)
Slenderhead darter	0.00	0.00	0.00	0.00	0.07	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.05)	(0.00)
River darter	0.03	0.00	0.00	0.00	0.00	0.00
	(0.03)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Sauger	0.29	0.00	0.14	0.17	0.00	0.00
	(0.10)	(0.00)	(0.14)	(0.11)	(0.00)	(0.00)
Walleye	0.58	0.17	0.14	0.08	1.09	0.00
	(0.22)	(0.17)	(0.14)	(0.08)	(0.51)	(0.00)
Freshwater drum	1.45	0.17	2.13	0.22	0.16	3.58
	(0.57)	(0.17)	(0.79)	(0.16)	(0.07)	(0.18)

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Table 2.3.2. Mean catch-per-unit-effort and (standard error) for fishes collected by using night electrofishing in Pool 8 of the Mississippi River using fixed-site sampling during 1991. See text for definitions of catch-per-unit-effort and standard error.

Common name	BWCS	MCBU	MCBW	SCB	TWZ
Chestnut lamprey	0.16	0.00	0.02	0.00	0.13
	(0.16)	(0.00)	(0.02)	(0.00)	(0.13)
Silver lamprey	0.28	0.00	0.00	0.00	0.00
	(0.21)	(0.00)	(0.00)	(0.00)	(0.00)
Longnose gar	0.15	0.14	0.57	0.32	0.00
	(0.15)	(0.09)	(0.29)	(0.18)	(0.00)
Shortnose gar	0.30	0.25	0.16	0.08	0.00
	(0.17)	(0.13)	(0.10)	(0.08)	(0.00)
Bowfin	0.15	0.00	0.00	0.07	0.00
	(0.10)	(0.00)	(0.00)	(0.07)	(0.00)
Mooneye	0.06	1.74	0.45	0.38	3.01
	(0.06)	(1.34)	(0.15)	(0.26)	(1.26)
Gizzard shad	14.84	7.10	0.70	16.29	8.40
	(4.31)	(2.78)	(0.20)	(7.37)	(7.09)
Spotfin shiner	6.01	0.82	0.00	8.03	0.11
	(2.60)	(0.56)	(0.00)	(3.53)	(0.11)
Common carp	4.44	1.57	1.52	3.31	3.23
	(1.26)	(0.54)	(0.83)	(1.07)	(0.79)
Mississippi silvery minnow	0.00	0.12	0.00	0.26	0.00
	(0.00)	(0.12)	(0.00)	(0.13)	(0.00)
Silver chub	0.26	0.29	0.13	1.62	0.59
	(0.20)	(0.20)	(0.07)	(0.69)	(0.38)
Pallid shiner	0.00	0.00	0.00	0.09	0.00
	(0.00)	(0.00)	(0.00)	(0.09)	(0.00)
Emerald shiner	20.68	7.91	0.68	20.64	6.76
	(6.50)	(1.86)	(0.21)	(4.01)	(3.57)
River shiner	0.14	5.80	0.00	2.45	0.14
	(0.10)	(5.51)	(0.00)	(1.50)	(0.14)
Spottail shiner	3.92	0.16	0.00	1.00	0.00
	(2.23)	(0.16)	(0.00)	(0.53)	(0.00)
Mimic shiner	0.75	0.51	0.00	6.60	0.67
	(0.62)	(0.28)	(0.00)	(2.08)	(0.43)
Pugnose minnow	1.16	0.00	0.00	0.16	0.11
	(0.60)	(0.00)	(0.00)	(0.11)	(0.11)
Bullhead minnow	23.98	1.24	0.09	15.47	1.05
	(9.81)	(0.51)	(0.07)	(6.68)	(0.47)
River carpsucker	0.05	0.16	0.02	0.17	0.75
	(0.05)	(0.16)	(0.02)	(0.11)	(0.75)
Quillback	1.84	3.55	0.36	0.55	7.81
	(0.97)	(1.53)	(0.10)	(0.32)	(1.98)
Highfin carpsucker	0.14	0.00	0.00	0.16	0.00
	(0.14)	(0.00)	(0.00)	(0.16)	(0.00)
Smallmouth buffalo	0.93	0.21	0.15	0.00	0.39
	(0.45)	(0.11)	(0.10)	(0.00)	(0.26)
Bigmouth buffalo	0.14	0.00	0.04	0.00	0.00
	(0.10)	(0.00)	(0.04)	(0.00)	(0.00)
Spotted sucker	2.27	0.00	0.00	0.00	1.25
	(0.87)	(0.00)	(0.00)	(0.00)	(0.59)
Silver redhorse	9.75	7.40	2.06	9.41	8.10
	(2.42)	(2.46)	(0.52)	(1.92)	(3.32)
River redhorse	0.06	0.21	1.61	0.26	0.50
	(0.06)	(0.15)	(0.41)	(0.14)	(0.25)
Golden redhorse	2.06	1.34	0.65	0.39	1.82
	(0.69)	(0.88)	(0.31)	(0.18)	(1.29)
Shorthead redhorse	3.90	9.37	6.72	7.56	2.62
	(0.89)	(4.15)	(1.42)	(1.82)	(1.16)
Channel catfish	0.13	0.94	0.43	5.21	1.28
	(0.09)	(0.30)	(0.15)	(1.87)	(0.87)
Tadpole madtom	0.07	0.00	0.00	0.00	0.00
	(0.07)	(0.00)	(0.00)	(0.00)	(0.00)

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TWZ - Tailwater

Table 2.3.2. Mean catch-per-unit-effort and (standard error) for fishes collected by using night electrofishing in Pool 8 of the Mississippi River using fixed-site sampling during 1991. See text for definitions of catch-per-unit-effort and standard error.

Common name	BWCS	MCBU	MCBW	SCB	TWZ
Flathead catfish	0.42	0.49	0.11	0.08	0.29
	(0.16)	(0.23)	(0.06)	(0.08)	(0.19)
Northern pike	0.44	0.00	0.00	0.08	0.91
	(0.20)	(0.00)	(0.00)	(0.08)	(0.48)
Trout perch	0.00	0.00	0.00	0.74	0.00
	(0.00)	(0.00)	(0.00)	(0.30)	(0.00)
Brook silverside	5.53	0.34	0.00	4.97	0.67
	(1.98)	(0.27)	(0.00)	(3.95)	(0.43)
White bass	12.83	12.41	0.86	16.48	22.83
	(3.2)	(4.77)	(0.35)	(8.92)	(7.86)
Yellow bass	0.31	0.00	0.00	0.07	0.24
	(0.18)	(0.00)	(0.00)	(0.07)	(0.15)
Rock bass	0.73	0.23	0.02	0.75	0.50
	(0.45)	(0.12)	(0.02)	(0.40)	(0.25)
Green sunfish	0.50	0.00	0.00	0.00	0.76
	(0.17)	(0.00)	(0.00)	(0.00)	(0.31)
Pumpkinseed	0.62	0.00	0.00	0.09	0.13
	(0.28)	(0.00)	(0.00)	(0.09)	(0.13)
Orangespotted sunfish	0.89	0.00	0.00	0.26	0.00
	(0.54)	(0.00)	(0.00)	(0.19)	(0.00)
Bluegill	58.73	1.17	0.80	5.50	12.07
	(19.10)	(0.73)	(0.37)	(2.39)	(5.07)
Green sunfish x warmouth	0.00	0.00	0.00	0.00	0.13
	(0.00)	(0.00)	(0.00)	(0.00)	(0.13)
Smallmouth bass	0.85	1.26	2.24	0.70	2.24
	(0.25)	(0.43)	(0.59)	(0.27)	(1.00)
Largemouth bass	20.78	0.26	0.09	2.28	4.53
	(5.82)	(0.17)	(0.07)	(0.88)	(2.58)
White crappie	0.22	0.00	0.00	0.08	0.70
	(0.11)	(0.00)	(0.00)	(0.08)	(0.35)
Black crappie	5.17	0.23	0.11	0.65	0.64
	(1.88)	(0.12)	(0.06)	(0.32)	(0.30)
Western sand darter	0.00	0.00	0.02	0.00	0.00
	(0.00)	(0.00)	(0.02)	(0.00)	(0.00)
Mud darter	0.43	0.00	0.00	0.08	0.00
	(0.20)	0.00)	(0.00)	(0.08)	(0.00)
Johnny darter	0.84	0.00	0.00	0.23	0.11
	(0.31)	(0.00)	(0.00)	(0.17)	(0.11)
Yellow perch	0.90	0.09	0.00	0.00	0.33
	(0.25)	(0.09)	(0.00)	(0.00)	(0.33)
Logperch	0.42	0.00	0.44	0.17	0.59
	(0.20)	(0.00)	(0.26)	(0.11)	(0.21)
Slenderhead darter	0.00	0.00	0.02	0.32	0.00
	(0.00)	(0.00)	(0.02)	(0.24)	(0.00)
Sauger	4.55	2.18	0.42	5.26	28.27
	(0.98)	(0.42)	(0.18)	(1.25)	(11.38)
Walleye	2.98	0.37	1.03	1.97	12.08
	(0.81)	(0.22)	(0.42)	(0.52)	(3.74)
Freshwater drum	4.77	6.31	2.71	12.32	7.90
	(1.16)	(2.96)	(1.15)	(6.12)	(3.35)

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Table 2.3.3. Mean catch-per-unit-effort and (standard error) for fishes collected by using fyke netting in Pool 8 of the Mississippi River using fixed-site sampling during 1991. See text for definitions of catch-per-unit-effort and standard error.

Common name	BWCS	IMPS	MCBW	TWZ
Silver lamprey	0.00	0.17	0.00	0.00
	(0.00)	(0.17)	(0.00)	(0.00)
Longnose gar	0.48	1.13	0.22	0.17
	(0.19)	(0.46)	(0.13)	(0.17)
Shortnose gar	0.91	2.12	0.00	0.17
	(0.34)	(0.73)	(0.00)	(0.17)
Bowfin	3.26	0.00	0.00	0.34
	(1.45)	(0.00)	(0.00)	(0.34)
Mooneye	0.00	0.33	0.00	0.00
	(0.00)	(0.21)	(0.00)	(0.00)
Gizzard shad	2.67	1.45	1.00	3.53
	(0.80)	(0.48)	(0.89)	(3.15)
Spotfin shiner	0.00	0.00	0.84	0.00
	(0.00)	(0.00)	(0.84)	(0.00)
Common carp	1.86	1.31	0.11	1.69
	(0.55)	(0.55)	(0.08)	(1.19)
Golden shiner	0.50	0.00	0.00	0.00
	(0.29)	(0.00)	(0.00)	(0.00)
Pugnose minnow	0.00	0.00	0.05	0.00
	(0.00)	(0.00)	(0.05)	(0.00)
Bullhead minnow	0.00	0.00	1.36	0.00
	(0.00)	(0.00)	(1.36)	(0.00)
River carpsucker	0.00	0.00	0.00	0.34
	(0.00)	(0.00)	(0.00)	(0.34)
Quillback	0.00	0.31	0.00	0.17
	(0.00)	(0.31)	(0.00)	(0.17)
White sucker	0.12	0.00	0.00	0.00
	(0.06)	(0.00)	(0.00)	(0.00)
Smallmouth buffalo	0.20	0.48	0.00	0.17
	(0.10)	(0.33)	(0.00)	(0.17)
Bigmouth buffalo	0.13	0.00	0.00	0.00
	(0.09)	(0.00)	(0.00)	(0.00)
Spotted sucker	0.93	0.16	0.00	0.67
	(0.31)	(0.16)	(0.00)	(0.34)
Silver redhorse	2.66	5.03	0.16	2.19
	(0.69)	(1.14)	(0.12)	(1.42)
Golden redhorse	0.12	0.16	0.06	0.17
	(0.08)	(0.16)	(0.06)	(0.17)
Shorthead redhorse	1.63	4.18	0.44	0.67
	(0.68)	(1.63)	(0.18)	(0.34)
Black bullhead	0.00	0.00	0.06	0.00
	(0.00)	(0.00)	(0.06)	(0.00)
Yellow bullhead	0.85	0.00	0.00	0.00
	(0.56)	(0.00)	(0.00)	(0.00)
Brown bullhead	0.04	0.00	0.00	0.00
	(0.04)	(0.00)	(0.00)	(0.00)
Channel catfish	0.04	0.16	0.54	0.17
	(0.04)	(0.16)	(0.25)	(0.17)
Flathead catfish	0.16	0.00	0.11	0.00
	(0.07)	(0.00)	(0.07)	(0.00)
Northern pike	1.26	0.00	0.11	1.18
	(0.32)	(0.00)	(0.08)	(0.66)
White bass	3.41	5.18	0.93	5.21
	(1.33)	(2.51)	(0.36)	(2.67)
Yellow bass	0.04	0.00	0.00	0.00
	(0.04)	(0.00)	(0.00)	(0.00)
Rock bass	0.00	0.00	0.06	0.00
	(0.00)	(0.00)	(0.06)	(0.00)
Green sunfish	0.04	0.00	0.06	0.00
	(0.04)	(0.00)	(0.06)	(0.00)

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Table 2.3.3. Mea catch-per-unit-effort and (standard error) for fishes collected by using fyke netting in Pool 8 of the Mississippi River using fixed-site sampling during 1991. See text for definitions of catch-per-unit-effort and standard error.

Common name	BWCS	IMPS	MCBW	TWZ
Pumpkinseed	0.28	0.00	0.06	0.67
	(0.12)	(0.00)	(0.06)	(0.49)
Warmouth	0.35	0.00	0.00	0.00
	(0.27)	(0.00)	(0.00)	(0.00)
Orangespotted sunfish	0.00	0.00	0.00	0.17
	(0.00)	(0.00)	(0.00)	(0.17)
Bluegill	50.84	0.16	5.07	9.31
	(15.26)	(0.16)	(1.81)	(2.73)
Green sunfish x bluegill	0.00	0.00	0.05	0.00
	(0.00)	(0.00)	(0.05)	(0.00)
Pumpkinseed x bluegill	0.04	0.00	0.00	0.00
	(0.04)	(0.00)	(0.00)	(0.00)
Largemouth bass	0.56	0.00	0.06	0.00
	(0.38)	(0.00)	(0.06)	(0.00)
White crappie	2.86	0.00	0.06	1.66
	(0.96)	(0.00)	(0.06)	(0.49)
Black crappie	23.61	2.12	1.27	6.23
	(4.99)	(0.64)	(0.48)	(2.68)
Yellow perch	0.33	0.00	0.00	0.00
	(0.11)	(0.00)	(0.00)	(0.00)
Sauger	0.00	0.16	0.17	0.34
	(0.00)	(0.16)	(0.09)	(0.34)
Walleye	0.13	0.32	0.05	0.00
	(0.07)	(0.32)	(0.05)	(0.00)
Freshwater drum	0.95	2.11	1.76	3.70
	(0.32)	(1.19)	(0.51)	(2.40)

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Table 2.3.4. Mean catch-per-unit-effort and (standard error) for fishes collected by using tandem fyke netting in Pool 8 of the Mississippi River using fixed-site sampling during 1991. See text for definitions of catch-per-unit-effort and standard error.

Common name	IMPO
Shortnose gar	0.08
	(0.08)
American eel	0.17
	(0.17)
Gizzard shad	0.15
	(0.15)
Common carp	0.08
	(0.08)
Silver redhorse	1.10
	(0.45)
Golden redhorse	0.08
	(0.08)
Shorthead redhorse	0.55
	(0.28)
Flathead catfish	0.08
	(0.08)
White bass	1.30
	(0.64)
Black crappie	0.08
	(0.08)
Sauger	0.15
	(0.10)
Freshwater drum	1.53
	(0.54)

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IMPO - Impounded, offshore
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Table 2.3.5. Mean catch-per-unit-effort and (standard error) for fishes collected by using mini fyke netting in Pool 8 of the Mississippi River using fixed-site sampling during 1991. See text for definitions of catch-per-unit-effort and standard error.

Common name	BWCS	IMPS	MCBW	TWZ
Silver lamprey	0.08	0.00	0.00	0.00
	(0.08)	(0.00)	(0.00)	(0.00)
Longnose gar	0.00	0.79	0.00	0.00
	(0.00)	(0.61)	(0.00)	(0.00)
Bowfin	0.08	0.00	0.00	0.17
	(0.08)	(0.00)	(0.00)	(0.17)
Gizzard shad	0.96	0.63	0.00	0.17
	(0.47)	(0.31)	(0.00)	(0.17)
Spotfin shiner	0.32	4.87	40.04	4.45
	(0.22)	(3.97)	(19.74)	(2.01)
Common carp	0.16	0.00	0.00	0.00
	(0.11)	(0.00)	(0.00)	(0.00)
Mississippi silvery minnow	0.00	0.00	0.00	0.17
	(0.00)	(0.00)	(0.00)	(0.17)
Golden shiner	1.98	0.00	0.00	0.84
	(1.71)	(0.00)	(0.00)	(0.66)
Emerald shiner	0.55	4.25	2.60	22.04
	(0.39)	(1.29)	(1.33)	(19.32)
River shiner	0.00	0.00	0.00	3.72
	(0.00)	(0.00)	(0.00)	(2.57)
Spottail shiner	1.86	1.55	0.33	4.90
	(0.72)	(1.55)	(0.16)	(2.96)
Weed shiner	0.00	0.00	0.00	0.34
	(0.00)	(0.00)	(0.00)	(0.34)
Mimic shiner	0.00	0.00	0.33	1.68
	(0.00)	(0.00)	(0.18)	(1.49)
Pugnose minnow	3.26	0.00	0.33	1.17
	(2.14)	(0.00)	(0.20)	(0.54)
Fathead minnow	0.00	0.00	0.06	0.00
	(0.00)	(0.00)	(0.06)	(0.00)
Bullhead minnow	2.95	3.64	12.26	12.11
	(1.12)	(1.91)	(6.13)	(6.43)
Creek chub	0.00	0.00	0.00	0.33
	(0.00)	(0.00)	(0.00)	(0.21)
Bigmouth buffalo	0.00	0.17	0.00	0.00
	(0.00)	(0.17)	(0.00)	(0.00)
Silver redhorse	0.08	0.47	0.00	0.00
	(0.08)	(0.32)	(0.00)	(0.00)
Shorthead redhorse	0.00	0.16	0.27	0.00
	(0.00)	(0.16)	(0.17)	(0.00)
Yellow bullhead	0.08	0.00	0.00	0.00
	(0.08)	(0.00)	(0.00)	(0.00)
Channel catfish	0.00	0.00	0.28	0.17
	(0.00)	(0.00)	(0.18)	(0.17)
Tadpole madtom	0.08	0.00	0.00	0.00
	(0.08)	(0.00)	(0.00)	(0.00)
Flathead catfish	0.00	0.17	0.06	0.00
	(0.00)	(0.17)	(0.06)	(0.00)
Central mudminnow	0.00	0.00	0.00	0.17
	(0.00)	(0.00)	(0.00)	(0.17)
Trout perch	0.00	0.00	0.06	0.00
	(0.00)	(0.00)	(0.06)	(0.00)
Brook silverside	0.33	0.16	0.06	0.51
	(0.18)	(0.16)	(0.06)	(0.51)
White bass	0.49	6.76	0.78	1.18
	(0.19)	(3.66)	(0.48)	(0.80)
Rock bass	0.00	0.00	0.11	0.00
	(0.00)	(0.00)	(0.08)	(0.00)
Green sunfish	0.09	0.00	0.00	0.00
	(0.09)	(0.00)	(0.00)	(0.00)

Strata: BWCS - Backwater, contiguous, shoreline
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IMPO - Impounded, offshore
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SCB - Side channel boarder
CTR - Main channel trough
TWZ - Tailwater

Table 2.3.5. Mean catch-per-unit-effort and (standard error) for fishes collected by using mini fyke netting in Pool 8 of the Mississippi River using fixed-site sampling during 1991. See text for definitions of catch-per-unit-effort and standard error.

Common name	BWCS	IMPS	MCBW	TWZ
Pumpkinseed	0.17	0.00	0.00	0.00
	(0.17)	(0.00)	(0.00)	(0.00)
Warmouth	0.08	0.00	0.00	0.00
	(0.08)	(0.00)	(0.00)	(0.00)
Orangespotted sunfish	0.57	0.00	0.00	0.00
	(0.49)	(0.00)	(0.00)	(0.00)
Bluegill	61.81	0.16	0.78	6.68
	(40.79)	(0.16)	(0.35)	(3.76)
Largemouth bass	2.30	0.00	0.00	0.84
	(1.96)	(0.00)	(0.00)	(0.66)
White crappie	0.32	0.00	0.00	0.17
	(0.18)	(0.00)	(0.00)	(0.17)
Black crappie	14.85	0.00	0.06	0.17
	(7.89)	(0.00)	(0.06)	(0.17)
Western sand darter	0.00	0.00	0.06	0.00
	(0.00)	(0.00)	(0.06)	(0.00)
Mud darter	0.17	0.00	0.78	0.00
	(0.17)	(0.00)	(0.45)	(0.00)
Johnny darter	0.32	0.00	0.00	1.52
	(0.18)	(0.00)	(0.00)	(1.17)
Yellow perch	0.39	0.00	0.00	0.00
	(0.39)	(0.00)	(0.00)	(0.00)
Logperch	0.16	0.00	0.39	12.50
	(0.16)	(0.00)	(0.20)	(11.70)
Slenderhead darter	0.00	0.16	0.11	0.00
	(0.00)	(0.16)	(0.08)	(0.00)
River darter	0.00	0.00	0.00	0.50
	(0.00)	(0.00)	(0.00)	(0.34)
Sauger	0.00	0.17	0.00	0.00
	(0.00)	(0.17)	(0.00)	(0.00)
Walleye	0.08	0.00	0.00	0.33
	(0.08)	(0.00)	(0.00)	(0.21)
Freshwater drum	0.08	0.00	0.33	0.00
	(0.08)	(0.00)	(0.20)	(0.00)

Strata: BWCS - Backwater, contiguous, shoreline
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SCB - Side channel boarder
CTR - Main channel trough
TWZ - Tailwater

Table 2.3.6. Mean catch-per-unit-effort and (standard error) for fishes collected by using tandem mini fyke netting in Pool 8 of the Mississippi River using fixed-site sampling during 1991. See text for definitions of catch-per-unit-effort and standard error.

Common name	IMPO
Gizzard shad	0.08
	(0.08)
Spotfin shiner	0.08
	(0.08)
Emerald shiner	0.09
	(0.09)
Bullhead minnow	0.09
	(0.0)
Channel catfish	1.12
	(0.54)
White bass	2.66
	(1.12)
Freshwater drum	1.73
	(0.49)

Strata: BWCS - Backwater, contiguous, shoreline
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IMPO - Impounded, offshore
MCBU - Main channel border, unstructured
MCBW - Main channel border, wing dam
SCB - Side channel boarder
CTR - Main channel trough
TWZ - Tailwater

Table 2.3.7. Mean catch-per-unit-effort and (standard error) for fishes collected by using tandem hoop netting in Pool 8 of the Mississippi River using fixed-site sampling during 1991. See text for definitions of catch-per-unit-effort and standard error.

Common name	MCBU	MCBW	SCB	TWZ
Longnose gar	0.00	0.13	0.00	0.00
	(0.00)	(0.13)	(0.00)	(0.00)
Shortnose gar	0.00	0.06	0.00	0.00
	(0.00)	(0.04)	(0.00)	(0.00)
Bowfin	0.00	0.00	0.04	0.00
	(0.00)	(0.00)	(0.04)	(0.00)
Common carp	1.41	1.19	1.02	2.18
	(0.54)	(0.47)	(0.44)	(0.60)
Silver chub	0.25	0.00	0.00	0.00
	(0.14)	(0.00)	(0.00)	(0.00)
Smallmouth buffalo	1.41	0.19	5.40	4.71
	(0.35)	(0.13)	(2.72)	(2.81)
Silver redhorse	2.14	0.46	4.60	3.15
	(1.01)	(0.17)	(2.81)	(1.84)
Golden redhorse	0.04	0.03	0.04	0.08
	(0.04)	(0.03)	(0.04)	(0.08)
Shorthead redhorse	1.92	0.70	3.12	0.32
	(1.08)	(0.21)	(2.20)	(0.20)
Channel catfish	9.71	0.37	7.54	2.57
	(2.64)	(0.16)	(2.48)	(1.38)
Flathead catfish	0.33	0.00	0.21	0.08
	(0.11)	(0.00)	(0.21)	(0.08)
Northern pike	0.00	0.00	0.04	0.00
	(0.00)	(0.00)	(0.04)	(0.00)
White bass	0.00	0.03	0.33	0.16
	(0.00)	(0.03)	(0.19)	(0.10)
Rock bass	0.00	0.00	0.04	0.00
	(0.00)	(0.00)	(0.04)	(0.00)
Bluegill	0.08	0.65	0.13	1.45
	(0.08)	(0.23)	(0.13)	(0.89)
Smallmouth bass	0.04	0.13	0.00	0.00
	(0.04)	(0.07)	(0.00)	(0.00)
White crappie	0.00	0.03	0.00	0.73
	(0.00)	(0.03)	(0.00)	(0.54)
Black crappie	0.29	0.44	0.00	2.10
	(0.10)	(0.15)	(0.00)	(1.10)
Sauger	0.00	0.00	0.04	0.00
	(0.00)	(0.00)	(0.04)	(0.00)
Walleye	0.08	0.03	0.00	0.00
	(0.08)	(0.03)	(0.00)	(0.00)
Freshwater drum	1.67	0.63	4.99	1.67
	(0.49)	(0.32)	(1.48)	(1.02)

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MCBW - Main channel border, wing dam
SCB - Side channel boarder
CTR - Main channel trough
TWZ - Tailwater

Table 2.3.8. Mean catch-per-unit-effort and (standard error) for fishes collected by using seining in Pool 8 of the Mississippi River using fixed-site sampling during 1991. See text for definitions of catch-per-unit-effort and standard error.

Common name	BWCS	MCBU	SCB
Longnose gar	0.00	0.00	0.08
	(0.00)	(0.00)	(0.08)
Gizzard shad	1.58	1.58	3.00
	(0.92)	(1.49)	(1.19)
Spotfin shiner	8.83	5.75	19.17
	(3.12)	(2.66)	(4.27)
Mississippi silvery minnow	0.00	0.00	26.83
	(0.00)	(0.00)	(26.74)
Golden shiner	0.08	0.00	0.17
	(0.08)	(0.00)	(0.11)
Pallid shiner	0.17	0.08	0.00
	(0.17)	(0.08)	(0.00)
Emerald shiner	2.58	42.67	22.25
	(1.46)	(17.10)	(8.55)
River shiner	2.00	14.92	4.33
	(1.42)	(5.50)	(1.33)
Spottail shiner	1.92	1.00	2.42
	(0.76)	(0.56)	(1.01)
Mimic shiner	0.33	2.00	3.75
	(0.26)	(0.95)	(1.72)
Pugnose minnow	4.83	0.08	0.25
	(3.35)	(0.08)	(0.13)
Bullhead minnow	10.75	4.33	10.50
	(3.51)	(1.46)	(3.91)
Quillback	0.00	0.58	0.00
	(0.00)	(0.42)	(0.00)
Spotted sucker	0.08	0.00	0.08
	(0.08)	(0.00)	(0.08)
Silver redhorse	0.08	0.00	0.08
	(0.08)	(0.00)	(0.08)
Shorthead redhorse	0.00	0.00	0.58
	(0.00)	(0.00)	(0.58)
Channel catfish	0.00	0.33	0.25
	(0.00)	(0.33)	(0.13)
Tadpole madtom	0.17	0.00	0.00
	(0.11)	(0.00)	(0.00)
Brook silverside	6.83	0.17	3.50
	(2.49)	(0.11)	(1.37)
White bass	0.92	2.42	0.92
	(0.75)	(0.96)	(0.43)
Rock bass	0.25	0.00	0.00
	(0.18)	(0.00)	(0.00)
Orangespotted sunfish	0.08	0.00	0.08
	(0.08)	(0.00)	(0.08)
Bluegill	6.42	0.33	0.50
	(3.71)	(0.19)	(0.19)
Smallmouth bass	0.17	0.08	0.33
	(0.17)	(0.08)	(0.26)
Largemouth bass	4.25	0.00	0.42
	(2.04)	(0.00)	(0.19)
Black crappie	1.25	0.00	0.00
	(0.99)	(0.00)	(0.00)
Western sand darter	0.00	1.17	0.92
	(0.00)	(0.67)	(0.62)
Mud darter	0.08	0.00	0.33
	(0.08)	(0.00)	(0.33)
Johnny darter	2.25	0.00	0.08
	(1.02)	(0.00)	(0.08)
Yellow perch	0.33	0.00	0.00
	(0.26)	(0.00)	(0.00)

Strata: BWCS - Backwater, contiguous, shoreline
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IMPO - Impounded, offshore
MCBU - Main channel border, unstructured
MCBW - Main channel border, wing dam
SCB - Side channel boarder
CTR - Main channel trough
TWZ - Tailwater

Table 2.3.8. Mean catch-per-unit-effort and (standard error) for fishes collected by using seining in Pool 8 of the Mississippi River using fixed-site sampling during 1991. See text for definitions of catch-per-unit-effort and standard error.

Common name	BWCS	MCBU	SCB
Logperch	1.58	0.00	0.42
	(0.73)	(0.00)	(0.19)
Freshwater drum	1.17	0.08	1.67
	(0.81)	(0.08)	(1.58)

Strata: BWCS - Backwater, contiguous, shoreline
BWCO - Backwater, contiguous, offshore
IMPS - Impounded, shoreline
IMPO - Impounded, offshore
MCBU - Main channel border, unstructured
MCBW - Main channel border, wing dam
SCB - Side channel boarder
CTR - Main channel trough
TWZ - Tailwater

Table 2.3.9. Mean catch-per-unit-effort and (standard error) for fishes collected by using bottom trawling in Pool 8 of the Mississippi River using fixed-site sampling during 1991. See text for definitions of catch-per-unit-effort and standard error.

Common name	MCBU	TWZ
Shovelnose sturgeon	0.00	1.08
	(0.00)	(0.42)
Mooneye	0.29	0.00
	(0.11)	(0.00)
Gizzard shad	0.04	0.08
	(0.04)	(0.08)
Common carp	0.13	0.08
	(0.09)	(0.08)
Speckled chub	0.00	0.08
	(0.00)	(0.08)
Silver chub	0.00	0.00
	(0.00)	(0.00)
Quillback	0.04	0.08
	(0.04)	(0.08)
Shorthead redhorse	0.00	0.00
	(0.00)	(0.00)
Channel catfish	0.38	3.67
	(0.16)	(1.60)
Flathead catfish	0.04	0.17
	(0.04)	(0.11)
White bass	0.58	0.00
	(0.39)	(0.00)
Sauger	0.00	0.08
	(0.00)	(0.08)
Walleye	0.04	0.00
	(0.04)	(0.00)
Freshwater drum	2.67	2.67
	(1.41)	(1.44)

Strata: BWCS - Backwater, contiguous, shoreline
BWCO - Backwater, contiguous, offshore
IMPS - Impounded, shoreline
IMPO - Impounded, offshore
MCBU - Main channel border, unstructured
MCBW - Main channel border, wing dam
SCB - Side channel boarder
CTR - Main channel trough
TWZ - Tailwater

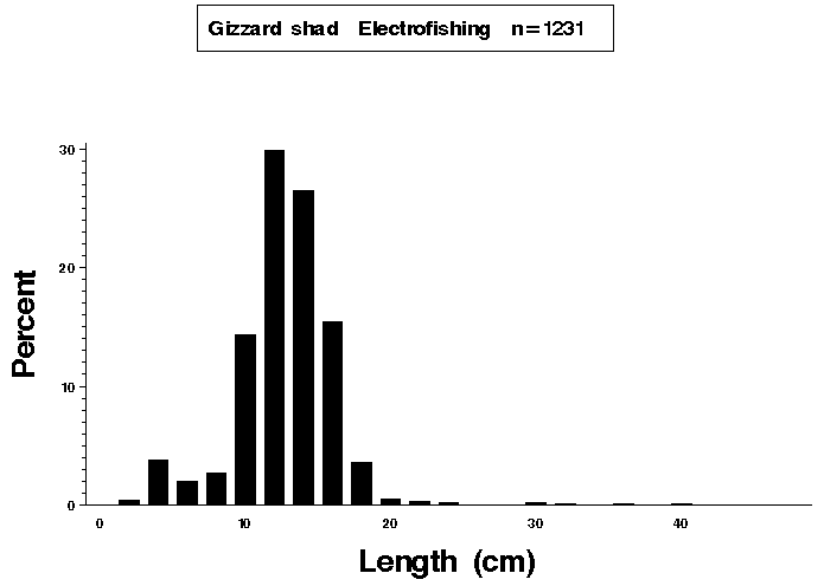

Figure 2.2. Length distributions (*length*) as a percentage of catch (*percent*) for gizzard shad (*Dorosoma cepedianum*) collected by electrofishing in Upper Mississippi River Pool 8 during 1991.

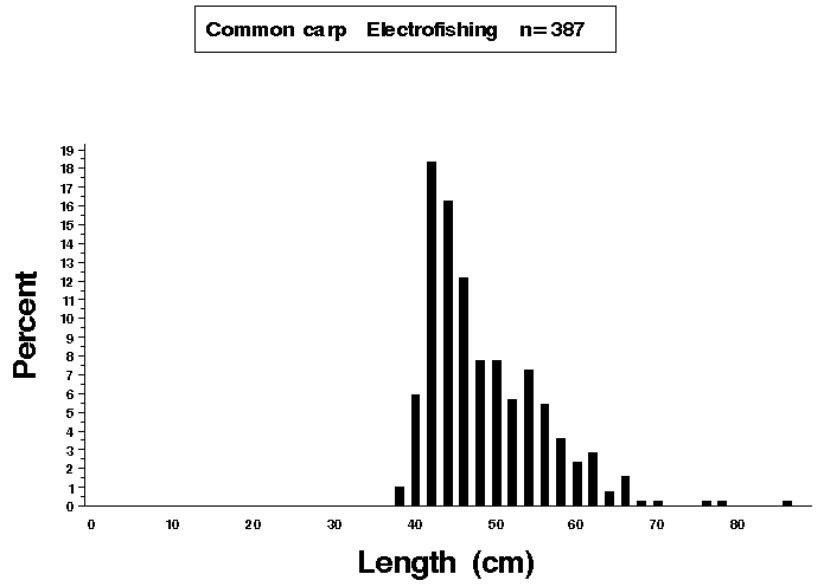

Figure 2.3. Length distributions (*length*) as a percentage of catch (*percent*) for common carp (*Cyprinus carpio*) collected by electrofishing in Upper Mississippi River Pool 8 during 1991.

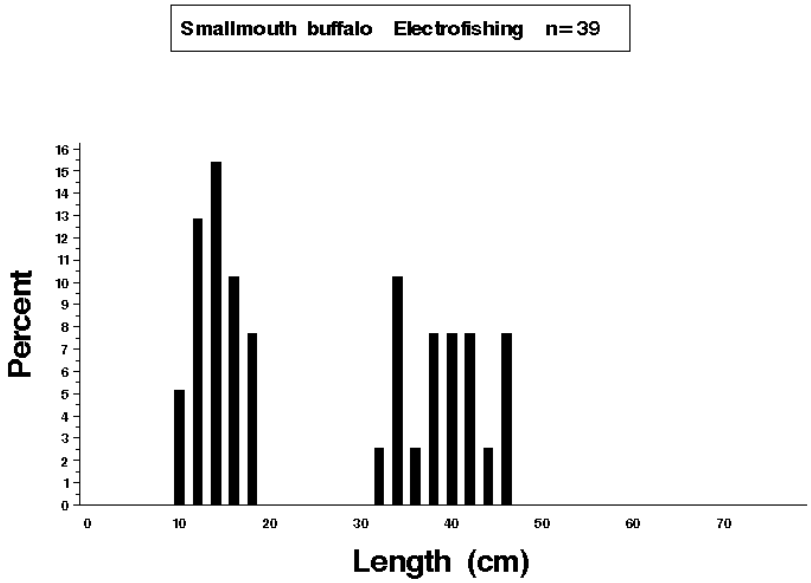

Figure 2.4. Length distributions (*length*) as a percentage of catch (*percent*) for smallmouth buffalo (*Ictiobus bubalus*) collected by electrofishing in Upper Mississippi River Pool 8 during 1991.

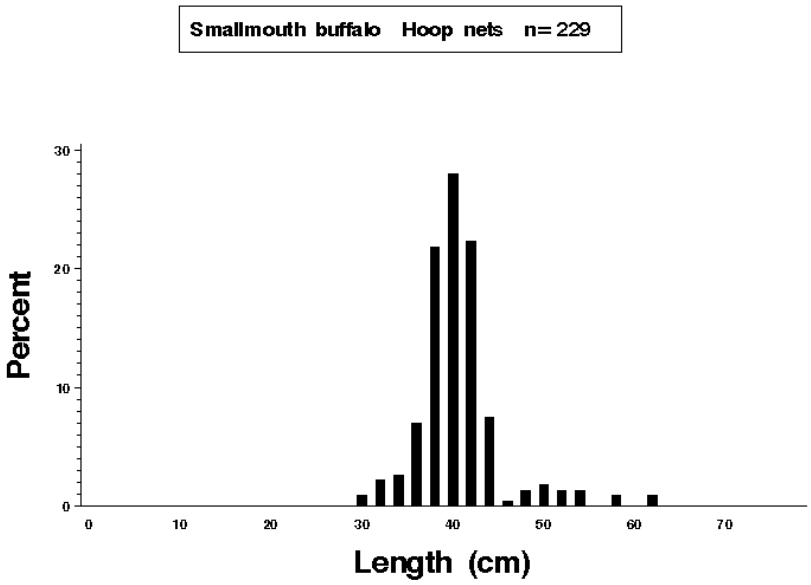

Figure 2.5. Length distributions (*length*) as a percentage of catch (*percent*) for smallmouth buffalo (*Ictiobus bubalus*) collected by large and small hoop netting in Upper Mississippi River Pool 8 during 1991.

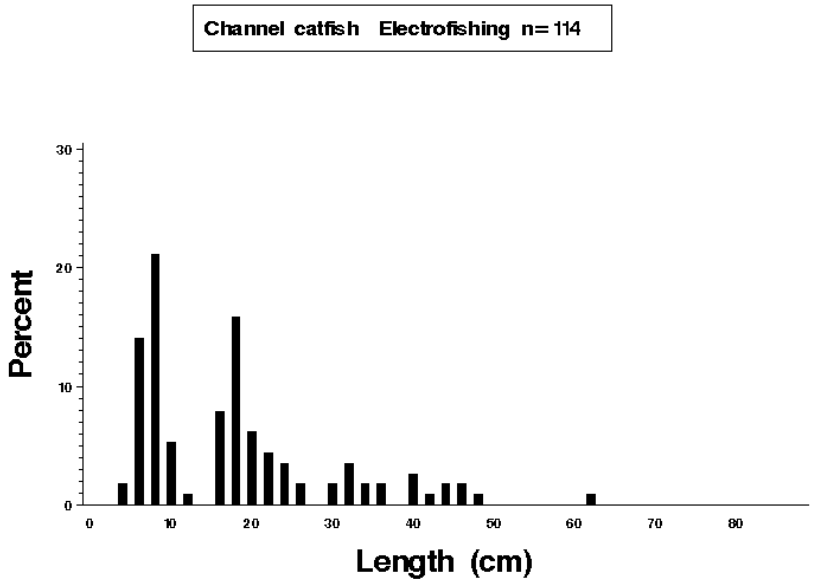

Figure 2.6. Length distributions (*length*) as a percentage of catch (*percent*) for channel catfish (*Ictalurus punctatus*) collected by electrofishing in Upper Mississippi River Pool 8 during 1991.

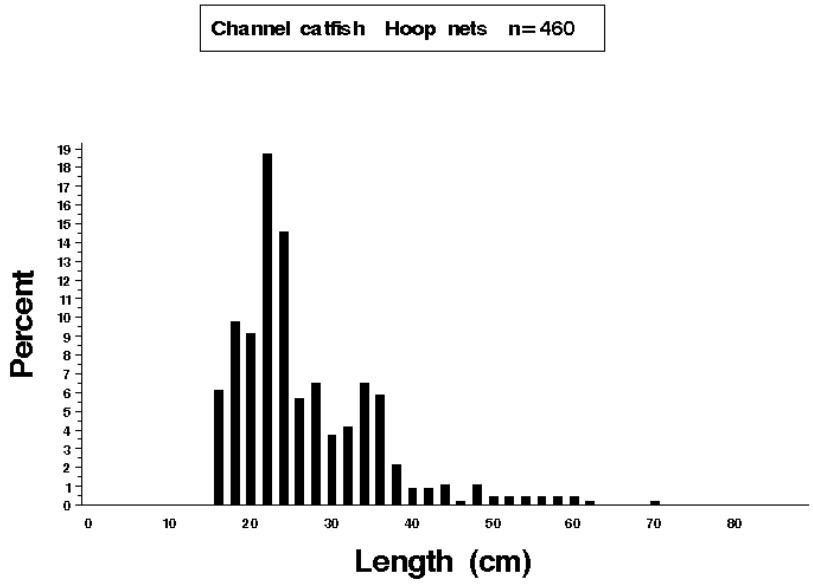

Figure 2.7. Length distributions (*length*) as a percentage of catch (*percent*) for channel catfish (*Ictalurus punctatus*) collected by large and small hoop netting in Upper Mississippi River Pool 8 during 1991.

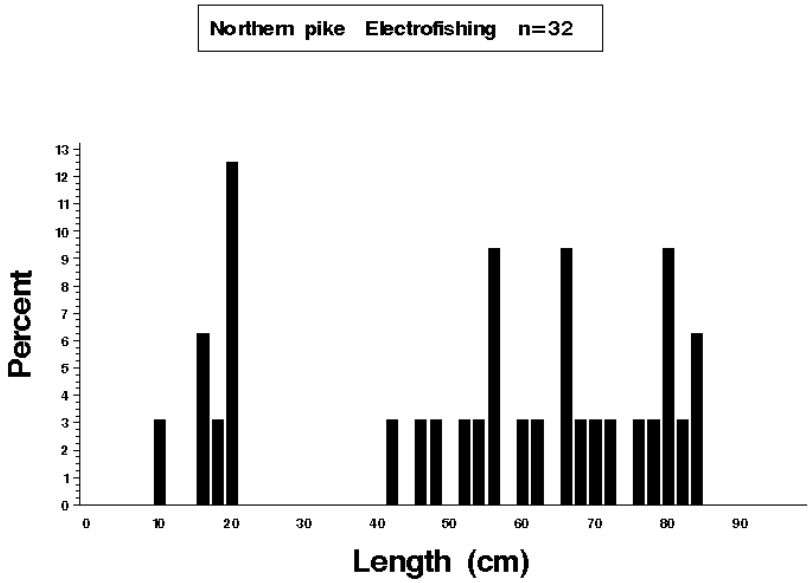

Figure 2.8. Length distributions (*length*) as a percentage of catch (*percent*) for northern pike (*Esox lucius*) collected by electrofishing in Upper Mississippi River Pool 8 during 1991.

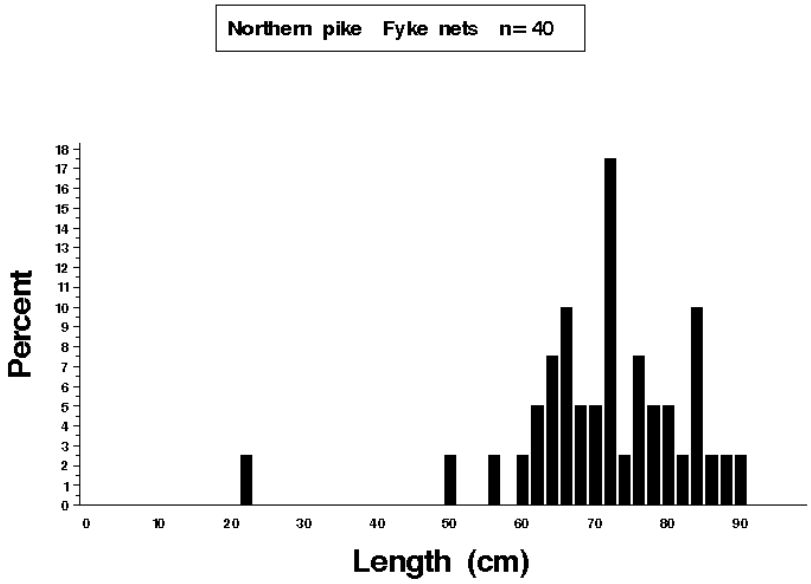

Figure 2.9. Length distributions (*length*) as a percentage of catch (*percent*) for northern pike (*Esox lucius*) collected by fyke netting in Upper Mississippi River Pool 8 during 1991.

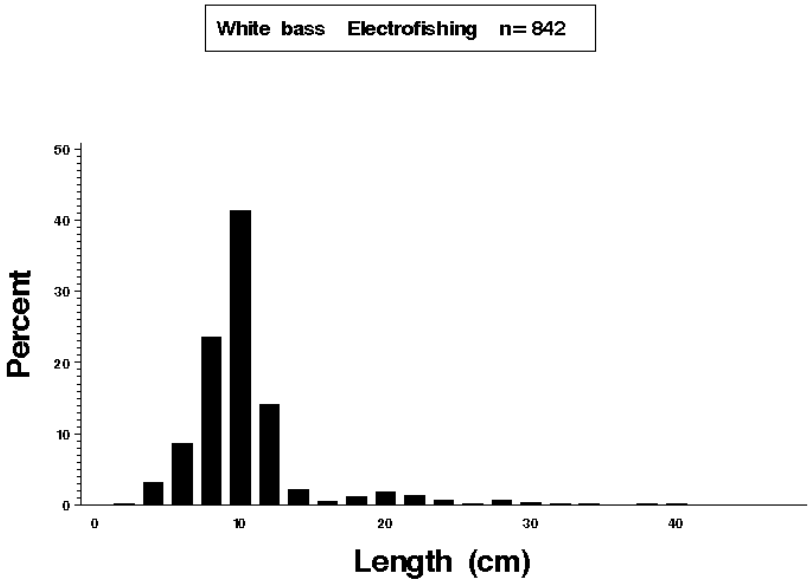

Figure 2.10. Length distributions (*length*) as a percentage of catch (*percent*) for white bass (*Morone chrysops*) collected by electrofishing in Upper Mississippi River Pool 8 during 1991.

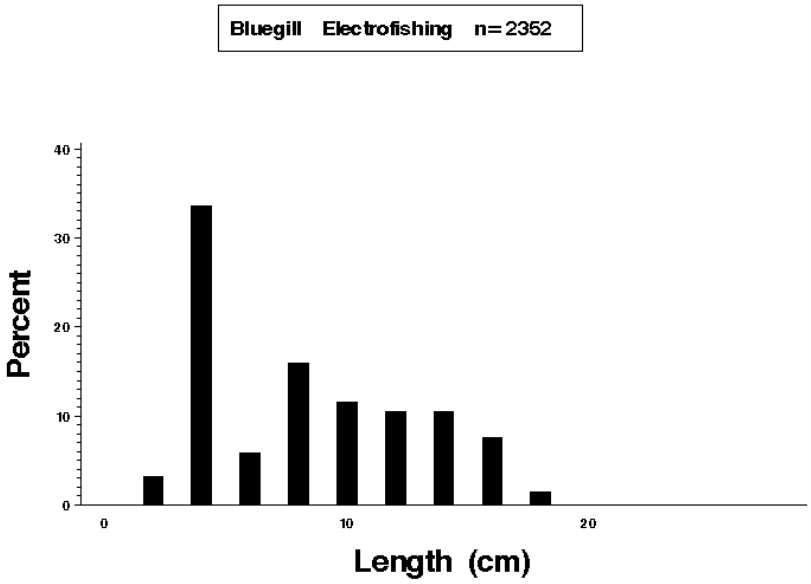

Figure 2.11. Length distributions (*length*) as a percentage of catch (*percent*) for bluegill (*Lepomis macrochirus*) collected by electrofishing in Upper Mississippi River Pool 8 during 1991.

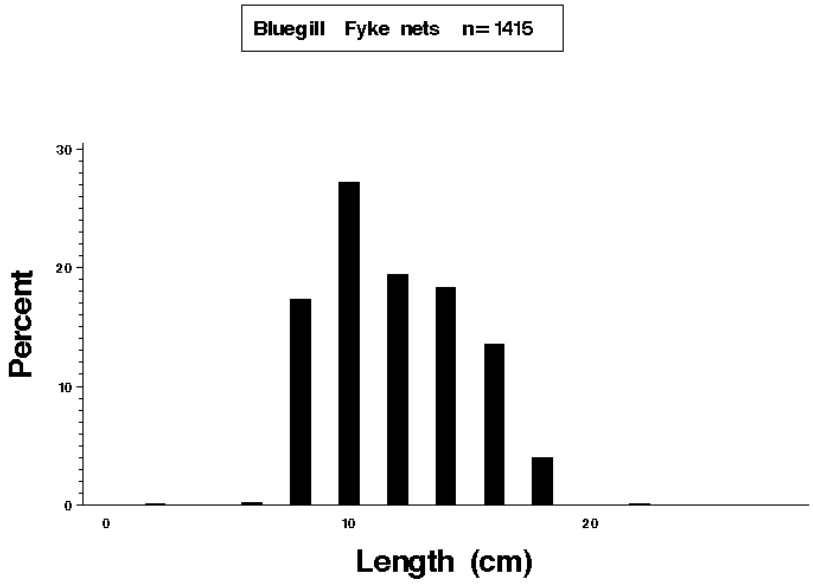

Figure 2.12. Length distributions (*length*) as a percentage of catch (*percent*) for bluegill (*Lepomis macrochirus*) collected by fyke netting in Upper Mississippi River Pool 8 during 1991.

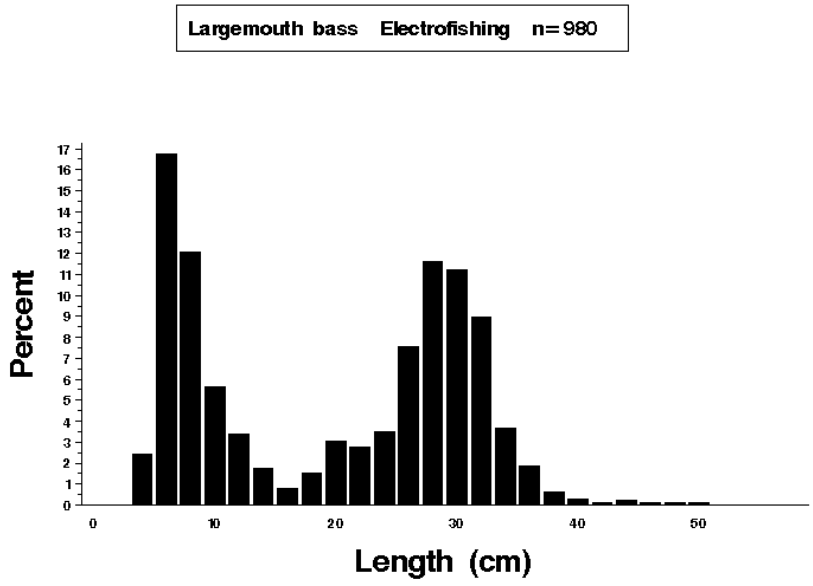

Figure 2.13. Length distributions (*length*) as a percentage of catch (*percent*) for largemouth bass (*Micropterus salmoides*) collected by electrofishing in Upper Mississippi River Pool 8 during 1991.

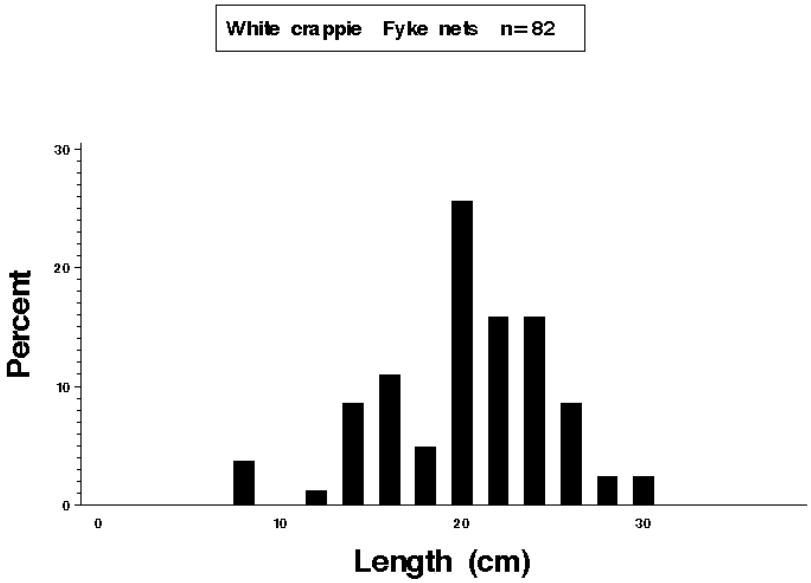

Figure 2.14. Length distributions (*length*) as a percentage of catch (*percent*) for white crappie (*Pomoxis annularus*) collected by electrofishing in Upper Mississippi River Pool 8 during 1991.

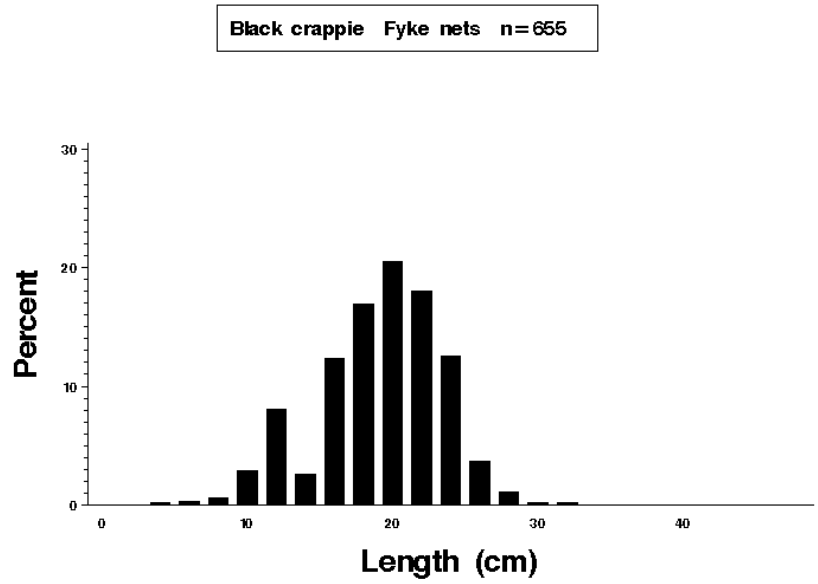

Figure 2.15. Length distributions (*length*) as a percentage of catch (*percent*) for black crappie (*Pomoxis nigromaculatus*) collected by electrofishing in Upper Mississippi River Pool 8 during 1991.

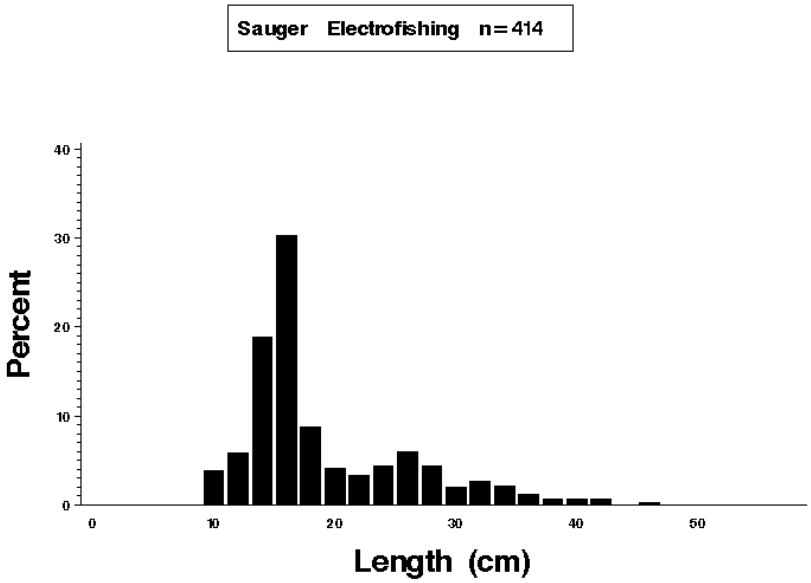

Figure 2.16. Length distributions (*length*) as a percentage of catch (*percent*) for sauger (*Stizostedion canadense*) collected by electrofishing in Upper Mississippi River Pool 8 during 1991.

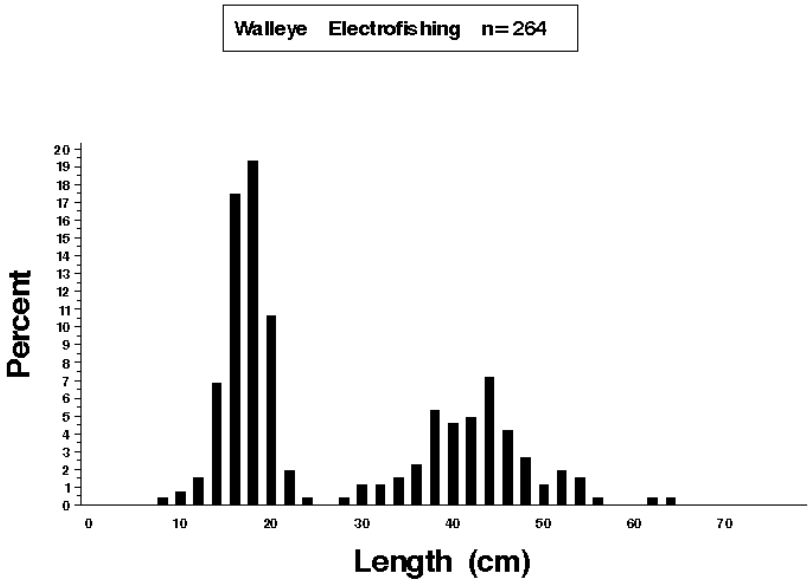

Figure 2.17. Length distributions (*length*) as a percentage of catch (*percent*) for walleye (*Stizostedion vitreum*) collected by electrofishing in Upper Mississippi River Pool 8 during 1991.

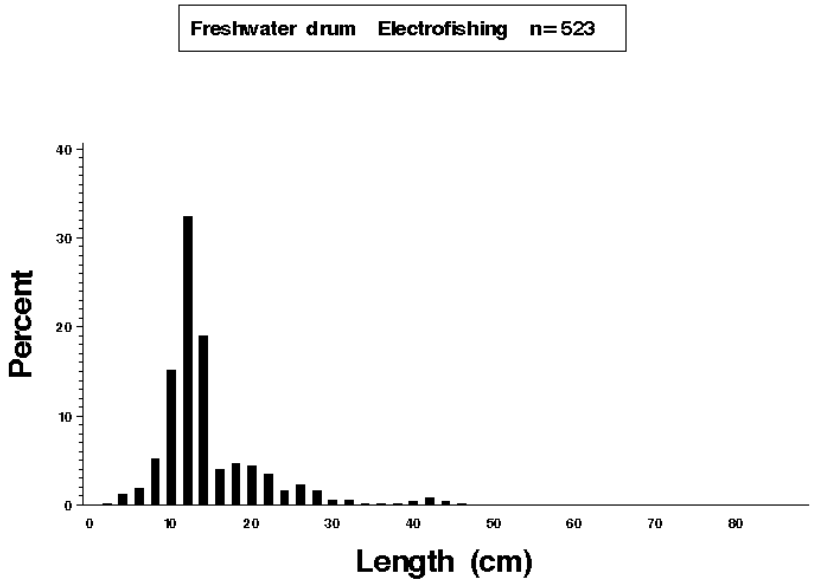

Figure 2.18. Length distributions (*length*) as a percentage of catch (*percent*) for freshwater drum (*Aplodinotus grunniens*) collected by electrofishing in Upper Mississippi River Pool 8 during 1991.

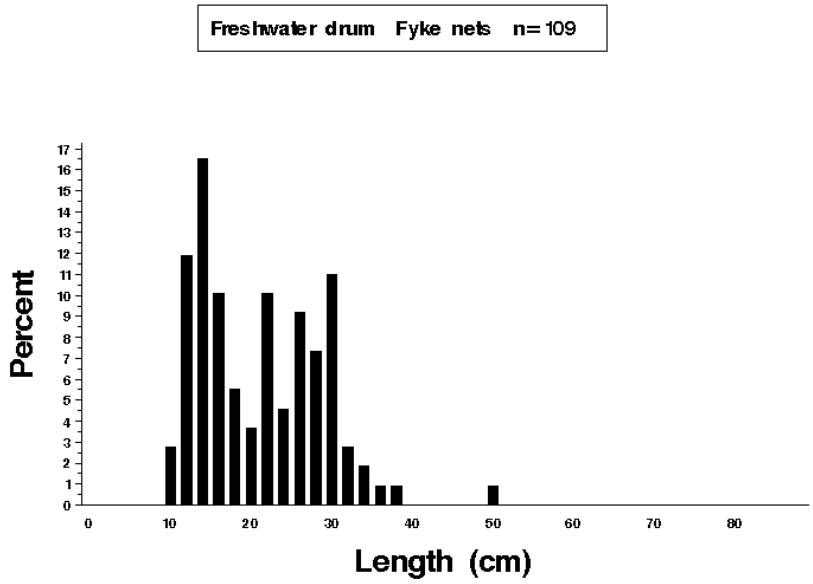

Figure 2.19. Length distributions (*length*) as a percentage of catch (*percent*) for freshwater drum (*Aplodinotus grunniens*) collected by fyke netting in Upper Mississippi River Pool 8 during 1991.

Chapter 3. Pool 13, Upper Mississippi River

by

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Hydrograph

For most of the sampling season, water levels remained nearly at or above the 50-year mean at the Lock and Dam 12 tailwater gage (Figure 3.1). During sampling, we encountered moderately high water levels near the end of the second period and the first 2.5 weeks of the third period (September 12–October 5). Because of high water, we did not complete 2-day electrofishing MCBW samples during the first period. The U.S. Army Corps of Engineers discharge data were obtained from the Environmental Management Technical Center (Wlosinski et al. 1995).

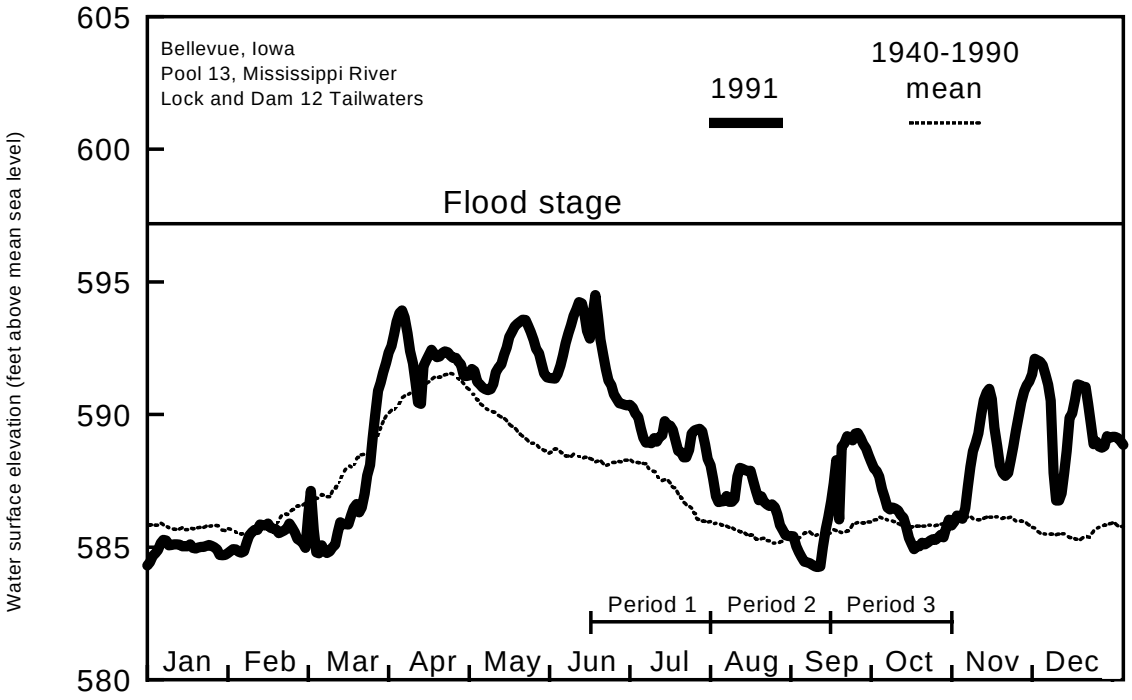

Figure 3.1. Daily water surface elevation from Lock and Dam 12 for Pool 13, Upper Mississippi River, during 1991 and mean elevation since 1940. The U.S. Army Corps of Engineers discharge data were obtained from the Environmental Management Technical Center (Wlosinski et al. 1995).

Summary of Sampling Effort

We sampled the fish population in Pool 13 in 1991 using nine types of gear that were deployed among seven strata types (Table 3.2). A total of 338 samples were completed. Sampling effort was nearly uniform among all three periods. We completed 112 samples in the first period, 114 samples in the second period, and 112 samples in the third period (Table 3.1).

Total Catch by Gear

We collected a total of 20,838 fish representing 62 species; no hybrids were reported. The top five species collected with all gears combined were the emerald shiner (3,965), bluegill (2,511), freshwater drum (2,336), gizzard shad (2,318), and white bass (1,814).

We collected 4,008 fish (50 species) by day electrofishing, 7,568 fish (51 species, including 1 unidentified *Notropis* species) by night electrofishing, 2,597 fish (35 species) by fyke netting, 576 fish (18 species) by tandem fyke netting, 2,370 fish (34 species) by mini fyke netting, 123 fish (11 species) by tandem mini fyke netting, 2,237 fish (28 species, including 6 unidentified *Notropis* species and 7 unidentified *Lepomis* species) by seining, 798 fish (25 species) by tandem hoop netting, and 561 fish (11 species) by trawling (Table 3.2).

We collected 1 lake sturgeon (Federally endangered) and 1 western sand darter in 1991, which are listed as endangered and threatened species, respectively, in Iowa. We also collected 46 pugnose minnows—this species is listed as being of special concern in Iowa. Other notable species we collected were 1 Mississippi silvery minnow, 1 fathead minnow, 60 quillback, 6 white suckers, 1 blue sucker, 1 silver redhorse, 1 stonecat, smallmouth bass, and 1 slenderhead darter. These species are listed as uncommon, rare, or tributary strays in Pool 13 by Pitlo et al. (1995) and are infrequently encountered in Long Term Resource Monitoring Program sampling.

Fixed Sampling, Mean *C/f* by Gear and Stratum

Mean *C/f*s of dominant fish species for fixed sampling by gear type and stratum are listed in Tables 3.3.1 to 3.3.9.

Day Electrofishing

Day electrofishing *C/f* (fish/15 min) was highest for bluegill (21.92) in the BWCS stratum, gizzard shad (27.83) in the IMPS stratum, emerald shiner (8.58) in the MCBU stratum, gizzard shad (10.00) in the MCBW stratum, and emerald shiner (12.08) in the SCB stratum (Table 3.3.1).

Night Electrofishing

Night electrofishing *C/f* (fish/15 min) was highest for bluegill (31.38) in the BWCS stratum, white bass (9.33) in the IMPS stratum, gizzard shad (103.25) in the MCBU stratum, freshwater drum (21.08) in the SCB stratum, and white bass (69.17) in the TWZ stratum (Table 3.3.2).

Fyke Net

Fyke netting *C/f* (fish per net-day) was highest for black crappie (16.83) in the BWCS stratum, gizzard shad (7.83) in the IMPS stratum, and white bass (66.50) in the TWZ stratum (Table 3.3.3).

Tandem Fyke Net

Tandem fyke netting *C/f* (fish per net-day) was highest for freshwater drum (25.33) in the IMPO stratum (Table 3.3.4).

Mini Fyke Net

Mini fyke netting *C/f* (fish per net-day) was highest for bluegill (14.42) in the BWCS stratum, emerald shiner (246.67) in the IMPS stratum, and channel shiner (20.33) in the TWZ stratum (Table 3.3.5).

Tandem Mini Fyke Net

Tandem mini fyke netting *C/f* (fish per net-day) was highest for freshwater drum (5.08) in the IMPS stratum (Table 3.3.6).

Tandem Hoop Net

Tandem hoop netting *C/f* (fish per net-day) was highest for freshwater drum (3.29) in the MCBU stratum, freshwater drum (1.58) in the SCB stratum, and freshwater drum (15.25) in the TWZ stratum (Table 3.3.7).

Seine

Seining *C/f* (fish per haul) was highest for emerald shiner (54.00) in the BWCS stratum, emerald shiner (36.92) in the MCBU stratum, and emerald shiner (17.25) in the SCB stratum (Table 3.3.8).

Trawl

Trawling *C/f* (fish per haul) was highest for channel catfish (12.71) in the MCBU stratum, channel catfish (2.50) in the CTR stratum, and freshwater drum (6.33) in the TWZ stratum (Table 3.3.9).

Length Distributions of Selected Species

Length distributions (expressed as a percentage of total catch for a species by various gears) for gizzard shad, common carp, smallmouth buffalo, channel catfish, northern pike, white bass, bluegill, largemouth bass, white crappie, black crappie, sauger, walleye, and freshwater drum are illustrated in Figures 3.2 to 3.17. Because data within a single sampling season are taken over a long time and size ranges for certain fish can overlap (e.g., a 6-cm-long bluegill collected early in period 1 is not of the same cohort as a 6-cm-long bluegill collected late in period 3), interpretations in the length distributions should be made cautiously. Length distributions from small samples ($n < 100$) may be included but are not statistically meaningful (Anderson and Neumann 1996).

Gizzard Shad

We collected 919 gizzard shad by day and night electrofishing, with lengths ranging from 3.1 to 48.2 cm (Figure 3.2). Mean length was 16.1 cm, and peak distribution occurred at 16 cm.

Common Carp

We collected 599 common carp by day and night electrofishing, with lengths ranging from 13.2 to 77.3 cm (Figure 3.3). Mean length was 48.5 cm, and peak distribution occurred at 44 cm, with the majority of fish ranging from 42 to 54 cm. Fish less than 30 cm composed only a small percentage of the total catch.

Smallmouth Buffalo

We collected 131 smallmouth buffalo by hoop netting, with lengths ranging from 17.2 to 46.2 cm (Figure 3.4). Mean length was 37.8 cm, and peak distribution occurred at 36 cm. Fish less than 28 cm composed only a small percentage of the total catch.

Channel Catfish

We collected 163 channel catfish by day and night electrofishing, with lengths ranging from 3.1 to 45.0 cm (Figure 3.5). Mean length was 15.7 cm, and peak distribution occurred at 6 cm. About 7% were longer than 38.1 cm (>15 inches).

We also collected 202 channel catfish by hoop netting, with lengths ranging from 16.5 to 54.0 cm (Figure 3.6). Mean length was 23.7 cm, and peak distribution occurred at 20 cm. About 3% were longer than 38.1 cm (>15 inches).

Northern Pike

We collected 34 northern pike by fyke netting, with lengths ranging from 25.0 to 86.6 cm (Figure 3.7). Mean length was 63.4 cm.

White Bass

We collected 1,012 white bass by day and night electrofishing, with lengths ranging from 4.1 to 34.5 cm (Figure 3.8). One white bass in the database (69.5 cm) is believed to have an erroneous measurement and should be omitted from any length analyses. Mean length was 12.0, and peak distribution occurred at 12 cm. Fish less than 14.0 cm are probably age 0 and contributed to 80% of the total catch. About 5% were longer than 22.9 cm (>9 inches).

Bluegill

We collected 1,712 bluegill by day and night electrofishing, with lengths ranging from 2.0 to 21.2 cm (Figure 3.9). Mean length was 8.9 cm, and peak distribution occurred at 4 cm. About 58% were less than 10 cm (<4 inches) and about 14% were greater than 15.2 cm (>6 inches). We also collected 424 bluegill by fyke netting, with lengths ranging from 7.5 to 21.1 cm (Figure 3.10). Mean length was 15.7 cm, and peak distribution occurred at 16 cm. About 64% were longer than 15.2 cm (>6 inches).

Largemouth Bass

We collected 578 largemouth bass by day and night electrofishing, with lengths ranging from 4.0 to 48.8 cm (Figure 3.11). Mean length was 21.6 cm, and peak distribution occurred at 6, 16, and 28 cm. Most fish less than 12.0 cm were probably age 0 and contributed to 28% of the total catch. About 6% were longer than 35.5 cm (>14 inches).

White Crappie

We collected 140 white crappie by fyke netting, with lengths ranging from 9.0 to 33.2 cm (Figure 3.12). Mean length was 21.8 cm, and peak distribution occurred at 20 cm. About 66% were longer than 20.3 cm (>8 inches).

Black Crappie

We collected 512 black crappie by fyke netting, with lengths ranging from 9.0 to 30.3 cm (Figure 3.13). Mean length was 19.5 cm, and peak distribution occurred at 18 and 20 cm. About 48% were longer than 20.3 cm (>8 inches).

Sauger

We collected 380 sauger by day and night electrofishing, with lengths ranging from 9.4 to 46.2 cm (Figure 3.14). Mean length was 20.0 cm, and peak distribution occurred at 16 cm. About 11% were longer than 30.5 cm (>12 inches).

Walleye

We collected 248 walleye by day and night electrofishing, with lengths ranging from 8.0 to 64.2 cm (Figure 3.15). Mean length was 29.0 cm, and peak distribution occurred at 10 cm. The majority of fish less than 23.0 cm are probably age 0 and contributed to 56% of the total catch. About 35% were longer than 38.1 cm (>15 inches).

Freshwater Drum

We collected 1,159 freshwater drum by day and night electrofishing, with lengths ranging from 3.5 to 47.0 cm (Figure 3.16). Mean length was 13.8 cm, and peak distribution occurred at 14 cm. Fish less than 18 cm are probably age 0 fish and contributed to 94% of the total catch. About 3% were longer than 30.5 cm (>12 inches). We also collected 600 freshwater drum by fyke netting, with lengths ranging from 6.5 to 43.5 cm (Figure 3.17). Mean length was 16.4 cm, and peak distribution occurred at 14 cm. About 6% were longer than 30.5 cm (>12 inches).

Table 3.1. Allocation of fish sampling effort among strata by the Long Term Resource Monitoring Program in Pool 13 of the Mississippi River during 1991. Table entries are numbers of successfully completed standardized monitoring collections.

Sampling period = 1: June 15 - July 31

Sampling gear	BWCS	BWCO	SCB	MCBU	MCBW	IMPS	IMPO	CTR	TWZ	TOTAL
Day electrofishing	8		4	4			4			20
Fyke net	8						2		2	12
Tandem hoop net			4	4					2	10
Mini fyke net	4						2		2	8
Night electrofishing	8		4	4			4		2	22
Seine	4		4	4						12
Trawling				8				12	4	24
Tandem fyke net							2			2
Tandem mini fyke net							2			2
SUBTOTAL	32	0	16	24	0	0	16	12	12	112

Sampling period = 2: August 1 - September 14

Sampling gear	BWCS	BWCO	SCB	MCBU	MCBW	IMPS	IMPO	CTR	TWZ	TOTAL
Day electrofishing	8		4	4	2		4			22
Fyke net	8						2		2	12
Tandem hoop net			4	4					2	10
Mini fyke net	4						2		2	8
Night electrofishing	8		4	4			4		2	22
Seine	4		4	4						12
Trawling				8				12	4	24
Tandem fyke net							2			2
Tandem mini fyke net							2			2
SUBTOTAL	32	0	16	24	2	0	16	12	12	114

Sampling period = 3: September 15 - October 31

Sampling gear	BWCS	BWCO	SCB	MCBU	MCBW	IMPS	IMPO	CTR	TWZ	TOTAL
Day electrofishing	8		4	2	2		4			20
Fyke net	8						2		2	12
Tandem hoop net			4	4					2	10
Mini fyke net	4						2			8
Night electrofishing	8		4	4			4		2	22
Seine	4		4	4						12
Trawling				8				12	4	24
Tandem fyke net							2			2
Tandem mini fyke net							2			2
SUBTOTAL	32	0	16	22	2	0	16	12	12	112
	96	0	48	70	4	0	48	36	36	338

Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.
BWCO - Backwater, contiguous, offshore. SCB - Side channel border.
IMPS - Impounded, shoreline. CTR - Main channel trough.
IMPO - Impounded, offshore. TWZ - Tailwater.
MCBU - Main channel border, unstructured.

Table 3.2. Total catches, by gear type, of fishes collected by the Long Term Resource Program during 1991 in Pool 13 of the Mississippi River. See Table 3.1 for the list of sampling gears actually deployed in this study reach.

Species	Common name	Scientific name	D	N	F	X	M	Y	S	H	T	TOTAL
1	Silver lamprey	Ichthyomyzon unicuspis	2	-	-	-	-	-	-	2	-	4
2	Lake sturgeon	Acipenser fulvescens	-	-	-	-	-	-	-	1	-	1
3	Shovelnose sturgeon	Scaphirhynchus platorynchus	-	-	-	-	-	-	-	1	12	13
4	Longnose gar	Lepisosteus osseus	2	30	10	1	8	-	-	2	-	53
5	Shortnose gar	Lepisosteus platostomus	3	9	48	-	4	-	-	-	-	64
6	Bowfin	Amia calva	4	8	18	-	1	-	-	1	-	32
7	Mooneye	Hiodon tergisus	2	9	-	11	-	-	-	4	-	26
8	Gizzard shad	Dorosoma cepedianum	593	1380	233	27	2	10	72	1	-	2318
9	Spotfin shiner	Cyprinella spiloptera	49	28	-	-	49	-	18	-	-	144
10	Common carp	Cyprinus carpio	357	299	30	-	4	-	-	75	-	765
11	Mississippi silvery minnow	Hybognathus nuchalis	-	-	-	-	1	-	-	-	-	1
12	Speckled chub	Macrhybopsis aestivalis	-	-	-	-	2	-	15	-	16	33
13	Silver chub	Macrhybopsis storeriana	54	166	4	-	1	-	-	-	2	227
14	Golden shiner	Notemigonus crysoleucas	5	7	6	1	-	-	-	-	-	19
15	Emerald shiner	Notropis atherinoides	552	595	-	-	1515	5	1298	-	-	3965
16	River shiner	Notropis blennius	136	289	-	-	140	-	125	-	-	690
17	Spottail shiner	Notropis hudsonius	6	6	-	-	12	-	4	-	-	28
18	Channel shiner	Notropis wickliffi	102	177	-	-	141	-	267	-	-	687
19	Unidentified shiner	Notropis sp.	-	1	-	-	-	-	6	-	-	7
20	Pugnose minnow	Opsopoeodus emiliae	1	1	-	-	35	-	9	-	-	46
21	Fathead minnow	Pimephales promelas	-	-	-	-	1	-	-	-	-	1
22	Bullhead minnow	Pimephales vigilax	154	134	-	-	87	-	63	-	1	439
23	River carpsucker	Carpiodes carpio	35	21	40	1	-	-	-	21	-	118
24	Quillback	Carpiodes cyprinus	4	9	2	-	-	-	-	1	-	16
25	Highfin carpsucker	Carpiodes velifer	3	23	1	-	-	-	-	1	-	28
26	White sucker	Catostomus commersoni	-	2	3	1	-	-	-	-	-	6
27	Blue sucker	Cycleptus elongatus	1	-	-	-	-	-	-	-	-	1
28	Smallmouth buffalo	Ictiobus bubalus	27	18	11	4	-	-	-	131	-	191
29	Bigmouth buffalo	Ictiobus cyprinellus	6	5	-	-	-	-	-	7	-	18
30	Spotted sucker	Minytrema melanops	32	38	65	4	-	-	2	1	-	142
31	Silver redhorse	Moxostoma anisurum	-	-	1	-	-	-	-	-	-	1
32	Golden redhorse	Moxostoma erythrurum	10	3	1	-	-	-	-	-	-	14
33	Shorthead redhorse	Moxostoma macrolepidotum	88	53	47	50	3	2	11	6	-	260
34	Black bullhead	Ameiurus melas	3	14	3	-	2	-	-	-	-	22
35	Yellow bullhead	Ameiurus natalis	1	7	14	-	6	2	-	1	-	31
36	Channel catfish	Ictalurus punctatus	28	135	19	-	4	3	22	202	403	816
37	Stonecat	Noturus flavus	-	-	-	-	-	-	-	-	1	1
38	Tadpole madtom	Noturus gyrinus	1	4	-	-	1	-	3	-	1	10
39	Flathead catfish	Pylodictis olivaris	7	19	8	-	2	-	-	19	4	59
40	Northern pike	Esox lucius	3	8	34	-	-	-	-	-	-	45

Gears: D - Day electrofishing
N - Night electrofishing
F - Fyke netting
M - Mini fyke netting
T - Trawling (4.8-m bottom trawl)
S - Seining
H - Small and large hoop netting
X - Tandem fyke netting
Y - Tandem mini fyke netting

Table 3.2. Total catches, by gear type, of fishes collected by the Long Term Resource Program during 1991 in Pool 13 of the Mississippi River. See Table 3.1 for the list of sampling gears actually deployed in this study reach.

Species	Commn name	Scientific name	D	N	F	X	M	Y	S	H	T	TOTAL
41	Brook silverside	Labidesthes sicculus	6	35	-	-	8	-	2	-	-	51
42	White bass	Morone chrysops	198	814	507	123	60	35	71	4	2	1814
43	Yellow bass	Morone mississippiensis	1	2	3	-	-	-	3	-	-	9
44	Rock bass	Ambloplites rupestris	2	3	1	1	-	-	-	1	-	8
45	Green sunfish	Lepomis cyanellus	-	1	-	-	-	-	-	-	-	1
46	Pumpkinseed	Lepomis gibbosus	39	33	39	31	2	1	3	-	-	148
47	Warmouth	Lepomis gulosus	1	-	1	-	1	-	-	-	-	3
48	Orangespotted sunfish	Lepomis humilis	185	103	1	-	-	-	5	1	-	295
49	Bluegill	Lepomis macrochirus	689	1061	423	1	212	1	121	3	-	2511
50	Unidentified Lepomis	Lepomis sp.	-	-	-	-	-	-	7	-	-	7
51	Smallmouth bass	Micropterus dolomieu	2	5	-	-	-	-	-	-	-	7
52	Largemouth bass	Micropterus salmoides	242	336	22	-	13	-	8	-	1	622
53	White crappie	Pomoxis annularis	46	24	139	1	9	-	4	-	-	223
54	Black crappie	Pomoxis nigromaculats	35	70	511	1	15	-	7	9	-	648
55	Western sand darter	Ammocrypta clara	-	-	-	-	-	-	1	-	-	1
56	Mud darter	Etheostoma asprigene	1	2	-	-	2	-	1	-	-	6
57	Johnny darter	Etheostoma nigrum	1	2	-	-	-	-	-	-	-	3
58	Yellow perch	Perca flavescens	-	1	2	-	-	-	-	-	-	3
59	Logperch	Percina caprodes	37	18	-	-	-	2	3	-	-	60
60	Slenderhead darter	Percina phoxocephala	-	1	-	-	-	-	-	-	-	1
61	River darter	Percina shumardi	7	17	-	-	6	-	7	-	-	37
62	Sauger	Stizostedion canadense	67	313	48	13	1	1	-	3	-	446
63	Walleye	Stizostedion vitreum	57	191	6	1	-	-	1	-	-	256
64	Freshwater drum	Aplodinotus grunniens	121	1038	296	304	20	61	78	300	118	2336
			4008	7568	2597	576	2370	123	2237	798	561	20838

Gears: D - Day electrofishing
N - Night electrofishing
F - Fyke netting
M - Mini fyke netting
T - Trawling (4.8-m bottom trawl)
S - Seining
H - Small and large hoop netting
X - Tandem fyke netting
Y - andem mini fyke netting

Table 3.3.1. Mean catch-per-unit-effort and (standard error) for fishes collected by using day electrofishing in Pool 13 of the Mississippi River using fixed-site sampling during 1991. See text for definitions of catch-per-unit-effort and standard error.

Common name	BWCS	IMPO	MCBU	MCBW	SCB
Silver lamprey	0.00	0.00	0.00	0.00	0.17
	(0.00)	(0.00)	(0.00)	(0.00)	(0.17)
Longnose gar	0.00	0.00	0.00	0.25	0.00
	(0.00)	(0.00)	(0.00)	(0.14)	(0.00)
Shortnose gar	0.04	0.00	0.00	0.13	0.08
	(0.04)	(0.00)	(0.00)	(0.13)	(0.08)
Bowfin	0.17	0.00	0.00	0.00	0.00
	(0.10)	(0.00)	(0.00)	(0.00)	(0.00)
Mooneye	0.00	0.00	0.20	0.00	0.00
	(0.00)	(0.00)	(0.13)	(0.00)	(0.00)
Gizzard shad	4.29	27.83	3.20	10.00	3.67
	(0.91)	(19.13)	(1.14)	(8.84)	(1.73)
Spotfin shiner	0.71	0.00	1.10	0.00	1.75
	(0.20)	(0.00)	(0.72)	(0.00)	(0.72)
Common carp	4.25	0.67	5.10	7.63	11.25
	(1.13)	(0.28)	(1.64)	(1.96)	(3.95)
Silver chub	1.04	0.58	1.30	0.00	0.75
	(0.43)	(0.43)	(0.62)	(0.00)	(0.43)
Golden shiner	0.17	0.08	0.00	0.00	0.00
	(0.17)	(0.08)	(0.00)	(0.00)	(0.00)
Emerald shiner	12.67	1.08	9.00	0.00	12.08
	(3.64)	(0.51)	(3.14)	(0.00)	(5.15)
River shiner	0.96	0.92	7.70	0.13	2.00
	(0.41)	(0.57)	(4.55)	(0.13)	(0.89)
Spottail shiner	0.08	0.33	0.00	0.00	0.00
	(0.06)	(0.26)	(0.00)	(0.00)	(0.00)
Channel shiner	1.83	0.08	1.30	0.13	3.58
	(0.57)	(0.08)	(0.72)	(0.13)	(1.61)
Pugnose minnow	0.04	0.00	0.00	0.00	0.00
	(0.04)	(0.00)	(0.00)	(0.00)	(0.00)
Bullhead minnow	4.67	0.25	0.70	0.00	2.67
	(1.53)	(0.18)	(0.26)	(0.00)	(1.24)
River carpsucker	1.13	0.00	0.10	0.63	0.17
	(0.44)	(0.00)	(0.10)	(0.47)	(0.11)
Quillback	0.08	0.00	0.20	0.00	0.00
	(0.06)	(0.00)	(0.13)	(0.00)	(0.00)
Highfin carpsucker	0.13	0.00	0.00	0.00	0.00
	(0.09)	(0.00)	(0.00)	(0.00)	(0.00)
Blue sucker	0.00	0.00	0.00	0.13	0.00
	(0.00)	(0.00)	(0.00)	(0.13)	(0.00)
Smallmouth buffalo	0.25	0.83	0.00	0.13	0.83
	(0.12)	(0.41)	(0.00)	(0.13)	(0.51)
Bigmouth buffalo	0.17	0.00	0.10	0.00	0.08
	(0.10)	(0.00)	(0.10)	(0.00)	(0.08)
Spotted sucker	1.33	0.00	0.00	0.00	0.00
	(0.53)	(0.00)	(0.00)	(0.00)	(0.00)
Golden redhorse	0.04	0.00	0.00	1.13	0.00
	(0.04)	(0.00)	(0.00)	(0.43)	(0.00)
Shorthead redhorse	0.58	0.00	0.40	8.13	0.42
	(0.25)	(0.00)	(0.27)	(0.31)	(0.19)
Black bullhead	0.13	0.00	0.00	0.00	0.00
	(0.13)	(0.00)	(0.00)	(0.00)	(0.00)
Yellow bullhead	0.00	0.08	0.00	0.00	0.00
	(0.00)	(0.08)	(0.00)	(0.00)	(0.00)
Channel catfish	0.25	0.00	1.20	0.13	0.75
	(0.14)	(0.00)	(0.44)	(0.13)	(0.33)
Tadpole madtom	0.04	0.00	0.00	0.00	0.00
	(0.04)	(0.00)	(0.00)	(0.00)	(0.00)
Flathead catfish	0.04	0.00	0.30	0.13	0.17
	(0.04)	(0.00)	(0.21)	(0.13)	(0.17)

Strata: BWCS - Backwater, contiguous, shoreline
BWCO - Backwater, contiguous, offshore
IMPS - Impounded, shoreline
IMPO - Impounded, offshore
MCBU - Main channel border, unstructured
MCBW - Main channel border, wing dam
SCB - Side channel boarder
CTR - Main channel trough
TWZ - Tailwater

Table 3.3.1. Mean catch-per-unit-effort and (standard error) for fishes collected by using day electrofishing in Pool 13 of the Mississippi River using fixed-site sampling during 1991. See text for definitions of catch-per-unit-effort and standard error.

Common name	BWCS	IMPO	MCBU	MCBW	SCB
Northern pike	0.13	0.00	0.00	0.00	0.00
	(0.07)	(0.00)	(0.00)	(0.00)	(0.00)
Brook silverside	0.21	0.00	0.00	0.00	0.08
	(0.10)	(0.00)	(0.00)	(0.00)	(0.08)
White bass	3.92	1.58	5.50	0.38	2.25
	(1.21)	(0.61)	(1.71)	(0.38)	(0.65)
Yellow bass	0.04	0.00	0.00	0.00	0.00
	(0.04)	(0.00)	(0.00)	(0.00)	(0.00)
Rock bass	0.00	0.00	0.20	0.00	0.00
	(0.00)	(0.00)	(0.13)	(0.00)	(0.00)
Pumpkinseed	1.13	0.67	0.10	0.00	0.25
	(0.30)	(0.36)	(0.10)	(0.00)	(0.18)
Warmouth	0.04	0.00	0.00	0.00	0.00
	(0.04)	(0.00)	(0.00)	(0.00)	(0.00)
Orangespotted sunfish	6.88	0.00	0.10	0.00	1.58
	(2.13)	(0.00)	(0.10)	(0.00)	(0.74)
Bluegill	21.92	2.58	1.70	1.63	8.50
	(4.63)	(2.07)	(0.45)	(1.07)	(3.66)
Smallmouth bass	0.04	0.00	0.00	0.13	0.00
	(0.04)	(0.00)	(0.00)	(0.13)	(0.00)
Largemouth bass	6.92	0.50	2.80	1.25	2.67
	(1.33)	(0.23)	(0.59)	(0.63)	(1.35)
White crappie	1.79	0.00	0.10	0.00	0.17
	(0.46)	(0.00)	(0.10)	(0.00)	(0.11)
Black crappie	1.33	0.00	0.00	0.00	0.25
	(0.46)	(0.00)	(0.00)	(0.00)	(0.25)
Mud darter	0.04	0.00	0.00	0.00	0.00
	(0.04)	(0.00)	(0.00)	(0.00)	(0.00)
Johnny darter	0.04	0.00	0.00	0.00	0.00
	(0.04)	(0.00)	(0.00)	(0.00)	(0.00)
Logperch	0.17	2.17	0.10	0.25	0.33
	(0.08)	(1.40)	(0.10)	(0.25)	(0.19)
River darter	0.04	0.17	0.30	0.00	0.08
	(0.04)	(0.11)	(0.15)	(0.00)	(0.08)
Sauger	1.75	0.00	0.60	0.25	1.42
	(0.68)	(0.00)	(0.40)	(0.25)	(0.66)
Walleye	0.29	0.08	0.10	5.75	0.17
	(0.14)	(0.08)	(0.10)	(3.34)	(0.17)
Freshwater drum	2.08	0.58	3.60	0.13	2.25
	(0.48)	(0.40)	(1.28)	(0.13)	(0.72)

Strata: BWCS - Backwater, contiguous, shoreline
BWCO - Backwater, contiguous, offshore
IMPS - Impounded, shoreline
IMPO - Impounded, offshore
MCBU - Main channel border, unstructured
MCBW - Main channel border, wing dam
SCB - Side channel boarder
CTR - Main channel trough
TWZ - Tailwater

Table 3.3.2. Mean catch-per-unit-effort and (standard error) for fishes collected by using night electrofishing in Pool 13 of the Mississippi River using fixed-site sampling during 1991. See text for definitions of catch-per-unit-effort and standard error.

Common name	BWCS	IMPO	MCBU	SCB	TWZ
Longnose gar	0.42	0.00	0.33	0.75	1.17
	(0.20)	(0.00)	(0.22)	(0.35)	(0.48)
Shortnose gar	0.13	0.00	0.00	0.25	0.50
	(0.07)	(0.00)	(0.00)	(0.13)	(0.34)
Bowfin	0.33	0.00	0.00	0.00	0.00
	(0.14)	(0.00)	(0.00)	(0.00)	(0.00)
Mooneye	0.00	0.17	0.08	0.08	0.83
	(0.00)	(0.11)	(0.08)	(0.08)	(0.40)
Gizzard shad	3.08	4.33	103.25	0.25	2.00
	(0.58)	(1.84)	(101.89)	(0.13)	(1.41)
Spotfin shiner	0.42	0.00	0.25	1.17	0.17
	(0.25)	(0.00)	(0.13)	(0.41)	(0.17)
Common carp	5.33	0.75	5.33	7.50	1.33
	(1.72)	(0.28)	(1.47)	(1.02)	(0.61)
Silver chub	2.96	0.75	0.50	3.08	7.17
	(0.96)	(0.41)	(0.29)	(1.51)	(2.85)
Golden shiner	0.25	0.00	0.08	0.00	0.00
	(0.17)	(0.00)	(0.08)	(0.00)	(0.00)
Emerald shiner	7.17	1.17	5.92	19.50	17.33
	(1.78)	(0.39)	(2.41)	(6.25)	(15.57)
River shiner	1.25	1.00	5.75	0.92	27.83
	(1.04)	(0.91)	(3.25)	(0.47)	(13.33)
Spottail shiner	0.08	0.33	0.00	0.00	0.00
	(0.06)	(0.19)	(0.00)	(0.00)	(0.00)
Channel shiner	1.29	0.08	3.42	5.08	7.17
	(0.68)	(0.08)	(1.72)	(1.73)	(6.40)
Pugnose minnow	0.04	0.00	0.00	0.00	0.00
	(0.04)	(0.00)	(0.00)	(0.00)	(0.00)
Bullhead minnow	3.00	0.08	1.50	3.00	1.17
	(1.03)	(0.08)	(0.65)	(1.11)	(0.60)
River carpsucker	0.29	0.00	0.50	0.42	0.50
	(0.09)	(0.00)	(0.29)	(0.19)	(0.50)
Quillback	0.29	0.00	0.00	0.00	0.33
	(0.15)	(0.00)	(0.00)	(0.00)	(0.33)
Highfin carpsucker	0.58	0.00	0.17	0.17	0.83
	(0.50)	(0.00)	(0.11)	(0.11)	(0.48)
White sucker	0.00	0.08	0.08	0.00	0.00
	(0.00)	(0.08)	(0.08)	(0.00)	(0.00)
Smallmouth buffalo	0.08	0.25	0.17	0.58	0.67
	(0.06)	(0.18)	(0.11)	(0.26)	(0.33)
Bigmouth buffalo	0.04	0.00	0.00	0.33	0.00
	(0.04)	(0.00)	(0.00)	(0.33)	(0.00)
Spotted sucker	0.83	0.00	0.00	0.08	2.83
	(0.35)	(0.00)	(0.00)	(0.08)	(1.11)
Golden redhorse	0.08	0.00	0.08	0.00	0.00
	(0.06)	(0.00)	(0.08)	(0.00)	(0.00)
Shorthead redhorse	1.00	0.17	1.08	0.92	0.50
	(0.29)	(0.11)	(0.51)	(0.36)	(0.50)
Black bullhead	0.58	0.00	0.00	0.00	0.00
	(0.58)	(0.00)	(0.00)	(0.00)	(0.00)
Yellow bullhead	0.21	0.08	0.00	0.00	0.17
	(0.13)	(0.08)	(0.00)	(0.00)	(0.17)
Channel catfish	1.21	4.17	2.58	1.33	1.50
	(0.43)	(2.48)	(0.95)	(0.57)	(1.31)
Tadpole madtom	0.17	0.00	0.00	0.00	0.00
	(0.08)	(0.00)	(0.00)	(0.00)	(0.00)
Flathead catfish	0.04	0.00	0.67	0.42	0.83
	(0.04)	(0.00)	(0.43)	(0.23)	(0.65)
Northern pike	0.17	0.00	0.00	0.00	0.67
	(0.10)	(0.00)	(0.00)	(0.00)	(0.49)

Strata: BWCS - Backwater, contiguous, shoreline MCBU - Main channel border, unstructured
BWCO - Backwater, contiguous, offshore MCBW - Main channel border, wing dam
IMPS - Impounded, shoreline SCB - Side channel boarder
IMPO - Impounded, offshoe CTR - Main channel trough TWZ - Tailwater

Table 3.3.2. Mean catch-per-unit-effort and (standard error) for fishes collected by using night electrofishing in Pool 13 of the Mississippi River using fixed-site sampling during 1991. See text for definitions of catch-per-unit-effort and standard error.

Common name	BWCS	IMPO	MCBU	SCB	TWZ
Brook silverside	0.75	0.25	0.42	0.17	1.17
	(0.33)	(0.18)	(0.29)	(0.11)	(0.54)
White bass	6.38	9.33	6.83	4.33	69.17
	(1.99)	(6.06)	(2.36)	(1.30)	(26.86)
Yellow bass	0.04	0.00	0.00	0.08	0.00
	(0.04)	(0.00)	(0.00)	(0.08)	(0.00)
Rock bass	0.00	0.00	0.17	0.00	0.17
	(0.00)	(0.00)	(0.17)	(0.00)	(0.17)
Green sunfish	0.00	0.00	0.00	0.08	0.00
	(0.00)	(0.00)	(0.00)	(0.08)	(0.00)
Pumpkinseed	0.75	0.17	0.00	0.83	0.50
	(0.24)	(0.11)	(0.00)	(0.75)	(0.22)
Orangespotted sunfish	3.25	0.00	0.08	1.50	1.00
	(0.95)	(0.00)	(0.08)	(1.41)	(0.63)
Bluegill	31.38	1.08	4.00	14.00	13.17
	(6.47)	(0.47)	(0.97)	(5.89)	(3.93)
Smallmouth bass	0.04	0.00	0.00	0.25	0.17
	(0.04)	(0.00)	(0.00)	(0.13)	(0.17)
Largemouth bass	6.38	0.42	2.00	2.67	20.33
	(1.49)	(0.23)	(0.64)	(1.15)	(5.32)
White crappie	0.79	0.00	0.00	0.08	0.67
	(0.23)	(0.00)	(0.00)	(0.08)	(0.33)
Black crappie	1.54	0.00	0.83	0.67	2.50
	(0.39)	(0.00)	(0.41)	(0.31)	(1.18)
Mud darter	0.04	0.00	0.08	0.00	0.00
	(0.04)	(0.00)	(0.08)	(0.00)	(0.00)
Johnny darter	0.08	0.00	0.00	0.00	0.00
	(0.08)	(0.00)	(0.00)	(0.00)	(0.00)
Yellow perch	0.04	0.00	0.00	0.00	0.00
	(0.04)	(0.00)	(0.00)	(0.00)	(0.00)
Logperch	0.42	0.00	0.00	0.25	0.83
	(0.23)	(0.00)	(0.00)	(0.18)	(0.48)
Slenderhead darter	0.00	0.00	0.08	0.00	0.00
	(0.00)	(0.00)	(0.08)	(0.00)	(0.00)
River darter	0.08	0.58	0.58	0.08	0.00
	(0.06)	(0.40)	(0.31)	(0.08)	(0.00)
Sauger	1.92	0.25	2.17	1.92	35.83
	(0.61)	(0.18)	(0.75)	(0.83)	(17.33)
Walleye	2.54	0.00	1.67	0.50	17.33
	(1.12)	(0.00)	(1.15)	(0.36)	(7.03)
Freshwater drum	12.88	3.25	23.92	21.08	25.00
	(2.81)	(2.25)	(6.43)	(10.09)	(13.56)

Strata: BWCS - Backwater, contiguous, shoreline
BWCO - Backwater, contiguous, offshore
IMPS - Impounded, shoreline
IMPO - Impounded, offshore
MCBU - Main channel border, unstructured
MCBW - Main channel border, wing dam
SCB - Side channel boarder
CTR - Main channel trough
TWZ - Tailwater

Table 3.3.3. Mean catch-per-unit-effort and (standard error) for fishes collected by using fyke nettin in Pool 13 of the Mississippi River using fixed-site sampling during 1991. See text for definitions of catch-per-unit-effort and standard error.

Common name	BWCS	IMPO	TWZ
Longnose gar	0.00	0.67	1.00
	(0.00)	(0.49)	(0.63)
Shortnose gar	0.38	5.33	1.17
	(0.22)	(2.81)	(0.65)
Bowfin	0.42	0.00	1.33
	(0.22)	(0.00)	(0.61)
Gizzard shad	7.50	7.83	1.00
	(3.94)	(2.82)	(1.00)
Common carp	0.29	2.33	1.50
	(0.13)	(1.58)	(0.96)
Silver chub	0.00	0.00	0.67
	(0.00)	(0.00)	(0.67)
Golden shiner	0.08	0.50	0.17
	(0.06)	(0.34)	(0.17)
River carpsucker	0.63	0.00	4.17
	(0.24)	(0.00)	(1.83)
Quillback	0.04	0.17	0.00
	(0.04)	(0.17)	(0.00)
Highfin carpsucker	0.00	0.00	0.17
	(0.00)	(0.00)	(0.17)
White sucker	0.04	0.33	0.00
	(0.04)	(0.21)	(0.00)
Smallmouth buffalo	0.21	0.17	0.83
	(0.10)	(0.17)	(0.65)
Spotted sucker	1.38	0.83	4.50
	(0.46)	(0.40)	(2.01)
Silver redhorse	0.04	0.00	0.00
	(0.04)	(0.00)	(0.00)
Golden redhorse	0.00	0.00	0.17
	(0.00)	(0.00)	(0.17)
Shorthead redhorse	1.25	2.17	0.67
	(0.35)	(0.87)	(0.42)
Black bullhead	0.04	0.33	0.00
	(0.04)	(0.33)	(0.00)
Yellow bullhead	0.25	1.17	0.17
	(0.17)	(0.65)	(0.17)
Channel catfish	0.54	0.67	0.33
	(0.28)	(0.42)	(0.33)
Flathead catfish	0.21	0.17	0.33
	(0.12)	(0.17)	(0.21)
Northern pike	0.67	0.17	2.83
	(0.22)	(0.17)	(1.56)
White bass	3.46	4.17	66.50
	(1.02)	(1.66)	(34.87)
Yellow bass	0.08	0.00	0.17
	(0.06)	(0.00)	(0.17)
Rock bass	0.00	0.00	0.17
	(0.00)	(0.00)	(0.17)
Pumpkinseed	0.08	5.83	0.33
	(0.06)	(1.22)	(0.21)
Warmouth	0.04	0.00	0.00
	(0.04)	(0.00)	(0.00)
Orangespotted sunfish	0.04	0.00	0.00
	(0.04)	(0.00)	(0.00)
Bluegill	5.50	7.67	40.83
	(1.23)	(1.41)	(12.00)
Largemouth bass	0.21	1.33	1.50
	(0.08)	(0.42)	(0.56)
White crappie	4.96	0.33	3.00
	(1.14)	(0.33)	(0.97)

Strata: BWCS - Backwater, contiguous, shoreline
BWCO - Backwater, contiguous, offshore
IMPS - Impounded, shoreline
IMPO - Impounded, offshore
MCBU - Main channel border, unstructured
MCBW - Main channel border, wing dam
SCB - Side channel boarder
CTR - Main channel trough
TWZ - Tailwater

Table 3.3.3. Mean catch-per-unit-effort and (standard error) for fishes collected by using fyke netting in Pool 13 of the Mississippi River using fixed-site sampling during 1991. See text for definitions of catch-per-unit-effort and standard error.

Common name	BWCS	IMPO	TWZ
Black crappie	16.83	3.33	14.50
	(6.89)	(1.58)	(3.56)
Yellow perch	0.08	0.00	0.00
	(0.06)	(0.00)	(0.00)
Sauger	0.96	3.17	1.00
	(0.29)	(0.91)	(0.45)
Walleye	0.08	0.33	0.33
	(0.06)	(0.21)	(0.33)
Freshwater drum	4.88	1.17	28.67
	(1.59)	(0.75)	(18.63)

Strata: BWCS - Backwater, contiguous, shoreline
BWCO - Backwater, contiguous, offshore
IMPS - Impounded, shoreline
IMPO - Impounded, offshore
MCBU - Main channel border, unstructured
MCBW - Main channel border, wing dam
SCB - Side channel boarder
CTR - Main channel trough
TWZ - Tailwater

Table 3.3.4. Mean catch-per-unit-effort and (standard error) for fishes collected by using tandem fyke netting in Pool 13 of the Mississippi River using fixed-site sampling during 1991. See text for definitions of catch-per-unit-effort and standard error.

Common name	IMPO
Longnose gar	0.08
	(0.08)
Mooneye	0.92
	(0.42)
Gizzard shad	2.25
	(1.01)
Golden shiner	0.08
	(0.08)
River carpsucker	0.08
	(0.08)
White sucker	0.08
	(0.08)
Smallmouth buffalo	0.33
	(0.17)
Spotted sucker	0.33
	(0.17)
Shorthead redhorse	4.17
	(1.49)
White bass	10.25
	(4.87)
Rock bass	0.08
	(0.08)
Pumpkinseed	2.58
	(1.90)
Bluegill	0.08
	(0.08)
White crappie	0.08
	(0.08)
Black crappie	0.08
	(0.08)
Sauger	1.08
	(0.24)
Walleye	0.08
	(0.08)
Freshwater drum	25.33
	(9.29)

Strata: BWCS - Backwater, contiguous, shoreline
BWCO - Backwater, contiguous, offshore
IMPS - Impounded, shoreline
IMPO - Impounded, offshore
MCBU - Main channel border, unstructured
MCBW - Main channel border, wing dam
SCB - Side channel boarder
CTR - Main channel trough
TWZ - Tailwater

Table 3.3.5. Mean catch-per-unit-effort and (standard error) for fishes collected by using mini fyke netting in Pool 13 of the Mississippi River using fixed-site sampling during 1991. See text for definitions of catch-per-unit-effort and standard error.

Common name	BWCS	IMPO	TWZ
Longnose gar	0.00	1.33	0.00
	(0.00)	(1.33)	(0.00)
Shortnose gar	0.33	0.00	0.00
	(0.19)	(0.00)	(0.00)
Bowfin	0.00	0.00	0.17
	(0.00)	(0.00)	(0.17)
Gizzard shad	0.08	0.17	0.00
	(0.08)	(0.17)	(0.00)
Spotfin shiner	0.00	4.00	4.17
	(0.00)	(3.01)	(1.80)
Common carp	0.00	0.67	0.00
	(0.00)	(0.42)	(0.00)
Mississippi silvery minnow	0.00	0.00	0.17
	(0.00)	(0.00)	(0.17)
Speckled chub	0.00	0.00	0.33
	(0.00)	(0.00)	(0.33)
Silver chub	0.00	0.17	0.00
	(0.00)	(0.17)	(0.00)
Emerald shiner	0.75	246.67	4.33
	(0.46)	(175.33)	(1.80)
River shiner	0.00	7.00	16.33
	(0.00)	(3.09)	(7.85)
Spottail shiner	0.00	2.00	0.00
	(0.00)	(1.48)	(0.00)
Channel shiner	1.00	1.17	20.33
	(0.41)	(0.75)	(10.11)
Pugnose minnow	2.67	0.50	0.00
	(1.80)	(0.34)	(0.00)
Fathead minnow	0.00	0.00	0.17
	(0.00)	(0.00)	(0.17)
Bullhead minnow	2.92	2.50	6.17
	(1.86)	(1.34)	(3.51)
Shorthead redhorse	0.08	0.17	0.17
	(0.08)	(0.17)	(0.17)
Black bullhead	0.17	0.00	0.00
	(0.11)	(0.00)	(0.00)
Yellow bullhead	0.25	0.50	0.00
	(0.18)	(0.50)	(0.00)
Channel catfish	0.17	0.17	0.17
	(0.11)	(0.17)	(0.17)
Tadpole madtom	0.00	0.17	0.00
	(0.00)	(0.17)	(0.00)
Flathead catfish	0.08	0.00	0.17
	(0.08)	(0.00)	(0.17)
Brook silverside	0.08	0.67	0.50
	(0.08)	(0.49)	(0.22)
White bass	0.33	6.50	2.83
	(0.14)	(3.82)	(1.82)
Pumpkinseed	0.08	0.00	0.17
	(0.08)	(0.00)	(0.17)
Warmouth	0.00	0.17	0.00
	(0.00)	(0.17)	(0.00)
Bluegill	14.42	4.00	2.50
	(7.68)	(1.26)	(1.28)
Largemouth bass	0.17	1.33	0.50
	(0.11)	(1.33)	(0.22)
White crappie	0.58	0.17	0.17
	(0.29)	(0.17)	(0.17)
Black crappie	1.00	0.33	0.17
	(0.46)	(0.21)	(0.17)

Strata: BWCS - Backwater, contiguous, shoreline
BWCO - Backwater, contiguous, offshore
IMPS - Impounded, shoreline
IMPO - Impounded, offshore
MCBU - Main channel border, unstructured
MCBW - Main channel border, wing dam
SCB - Side channel boarder
CTR - Main channel trough
TWZ - Tailwater

Table 3.3.5. Mean catch-per-unit-effort and (standard error) for fishes collected by using mini fyke netting in Pool 13 of the Mississippi River using fixed-site sampling during 1991. See text for definitions of catch-per-unit-effort and standard error.

Common name	BWCS	IMPO	TWZ
Mud darter	0.17	0.00	0.00
	(0.11)	(0.00)	(0.00)
River darter	0.00	0.00	1.00
	(0.00)	(0.00)	(0.63)
Sauger	0.00	0.00	0.17
	(0.00)	(0.00)	(0.17)
Freshwater drum	1.25	0.50	0.33
	(0.70)	(0.50)	(0.21)

Strata: BWCS - Backwater, contiguous, shoreline
BWCO - Backwater, contiguous, offshore
IMPS - Impounded, shoreline
IMPO - Impounded, offshore
MCBU - Main channel border, unstructured
MCBW - Main channel border, wing dam
SCB - Side channel boarder
CTR - Main channel trough
TWZ - Tailwater

Table 3.3.6. Mean catch-per-unit-effort and (standard error) for fishes collected by usin tandem mini fyke netting in Pool 13 of the Mississippi River using fixed-site sampling during 1991. See text for definitions of catch-per-unit-effort and standard error.

Common name	IMPO
Gizzard shad	0.83
	(0.83)
Emerald shiner	0.42
	(0.20)
Shorthead redhorse	0.17
	(0.17)
Yellow bullhead	0.17
	(0.17)
Channel catfish	0.25
	(0.17)
White bass	2.92
	(1.64)
Pumpkinseed	0.08
	(0.08)
Bluegill	0.08
	(0.08)
Logperch	0.17
	(0.11)
Sauger	0.08
	(0.08)
Freshwater drum	5.08
	(0.87)

Strata: BWCS - Backwater, contiguous, shoreline
BWCO - Backwater, contiguous, offshore
IMPS - Impounded, shoreline
IMPO - Impounded, offshore
MCBU - Main channel border, unstructured
MCBW - Main channel border, wing dam
SCB - Side channel boarder
CTR - Main channel trough
TWZ - Tailwater

Table 3.3.7. Mean catch-per-unit-effort and (standard error) for fishes collected by using tandem hoop netting in Pool 13 of the Mississippi River using fixed-site sampling during 1991. See text for definitions of catch-per-unit-effort and standard error.

Common name	MCBU	SCB	TWZ
Silver lamprey	0.08	0.00	0.00
	(0.08)	(0.00)	(0.00)
Lake sturgeon	0.04	0.00	0.00
	(0.04)	(0.00)	(0.00)
Shovelnose sturgeon	0.00	0.00	0.08
	(0.00)	(0.00)	(0.08)
Longnose gar	0.00	0.08	0.00
	(0.00)	(0.08)	(0.00)
Bowfin	0.04	0.00	0.00
	0.04)	(0.00)	(0.00)
Mooneye	0.17	0.00	0.00
	(0.17)	(0.00)	(0.00)
Gizzard shad	0.00	0.00	0.08
	(0.00)	(0.00)	(0.08)
Common carp	1.13	0.21	3.58
	(0.61)	(0.10)	(2.58)
River carpsucker	0.08	0.04	1.50
	(0.06)	(0.04)	(0.81)
Quillback	0.00	0.00	0.08
	(0.00)	(0.00)	(0.08)
Highfin carpsucker	0.00	0.00	0.08
	(0.00)	(0.00)	(0.08)
Smallmouth buffalo	2.71	1.25	3.00
	(1.36)	(0.76)	(1.62)
Bigmouth buffalo	0.04	0.21	0.08
	(0.04)	(0.21)	(0.08)
Spotted sucker	0.00	0.00	0.08
	(0.00)	(0.00)	(0.08)
Shorthead redhorse	0.13	0.13	0.00
	(0.07)	(0.07)	(0.00)
Yellow bullhead	0.00	0.00	0.08
	(0.00)	(0.00)	(0.08)
Channel catfish	0.63	0.50	14.58
	(0.24)	(0.22)	(9.15)
Flathead catfish	0.33	0.25	0.42
	(0.11)	(0.10)	(0.20)
White bass	0.08	0.00	0.17
	(0.08)	(0.00)	(0.17)
Rock bass	0.04	0.00	0.00
	(0.04)	(0.00)	(0.00)
Orangespotted sunfish	0.00	0.00	0.08
	(0.00)	(0.00)	(0.08)
Bluegill	0.04	0.04	0.08
	(0.04)	(0.04)	(0.08)
Black crappie	0.08	0.00	0.58
	(0.08)	(0.00)	(0.58)
Sauger	0.00	0.00	0.25
	(0.00)	(0.00)	(0.11)
Freshwater drum	3.29	1.58	15.25
	(0.63)	(0.62)	(7.69)

Strata: BWCS - Backwater, contiguous, shoreline
BWCO - Backwater, contiguous, offshore
IMPS - Impounded, shoreline
IMPO - Impounded, offshore
MCBU - Main channel border, unstructured
MCBW - Main channel border, wing dam
SCB - Side channel boarder
CTR - Main channel trough
TWZ - Tailwater

Table 3.3.8. Mean catch-per-unit-effort and (standard error) for fishes collected by using seining in Pool 13 of the Mississippi River using fixed-site sampling during 1991. See text for definitions of catch-per-unit-effort and standard error.

Common name	BWCS	MCBU	SCB
Gizzard shad	1.08	1.42	3.50
	(0.71)	(1.33)	(3.24)
Spotfin shiner	0.42	1.00	0.08
	(0.23)	(0.56)	(0.08)
Speckled chub	0.00	0.33	0.92
	(0.00)	(0.26)	(0.58)
Emerald shiner	54.00	36.92	17.25
	(38.01)	(26.54)	(9.61)
River shiner	1.50	6.00	2.92
	(0.81)	(1.42)	(1.01)
Spottail shiner	0.00	0.00	0.33
	(0.00)	(0.00)	(0.33)
Channel shiner	11.58	6.08	4.58
	(6.09)	(1.98)	(1.59)
Pugnose minnow	0.75	0.00	0.00
	(0.37)	(0.00)	(0.00)
Bullhead minnow	0.92	1.67	2.67
	(0.50)	(0.54)	(0.92)
Spotted sucker	0.17	0.00	0.00
	(0.11)	(0.00)	(0.00)
Shorthead redhorse	0.00	0.17	0.75
	(0.00)	(0.11)	(0.41)
Channel catfish	0.83	0.50	0.50
	(0.75)	(0.29)	(0.50)
Tadpole madtom	0.00	0.08	0.17
	(0.00)	(0.08)	(0.17)
Brook silverside	0.00	0.08	0.08
	(0.00)	(0.08)	(0.08)
White bass	1.58	1.17	3.17
	(1.16)	(0.65)	(1.82)
Yellow bass	0.17	0.08	0.00
	(0.17)	(0.08)	(0.00)
Pumpkinseed	0.25	0.00	0.00
	(0.18)	(0.00)	(0.00)
Orangespotted sunfish	0.33	0.00	0.08
	(0.26)	(0.00)	(0.08)
Bluegill	8.92	0.67	0.50
	(3.18)	(0.43)	(0.23)
Largemouth bass	0.33	0.00	0.33
	(0.22)	(0.00)	(0.19)
White crappie	0.33	0.00	0.00
	(0.33)	(0.00)	(0.00)
Black crappie	0.58	0.00	0.00
	(0.29)	(0.00)	(0.00)
Western sand darter	0.00	0.00	0.08
	(0.00)	(0.00)	(0.08)
Mud darter	0.08	0.00	0.00
	(0.08)	(0.00)	(0.00)
Logperch	0.25	0.00	0.00
	(0.18)	(0.00)	(0.00)
River darter	0.33	0.00	0.25
	(0.19)	(0.00)	(0.18)
Walleye	0.08	0.00	0.00
	(0.08)	(0.00)	(0.00)
Freshwater drum	0.58	1.00	4.92
	(0.40)	(0.64)	(4.22)

Strata: BWCS - Backwater, contiguous, shoreline
BWCO - Backwater, contiguous, offshore
IMPS - Impounded, shoreline
IMPO - Impounded, offshore
MCBU - Main channel border, unstructured
MCBW - Main channel border, wing dam
SCB - Side channel boarder
CTR - Main channel trough
TWZ - Tailwater

Table 3.3.9. Mean catch-per-unit-effort and (standard error) for fishes collected by using bottom trawling in Pool 13 of the Mississippi River using fixed-site sampling during 1991. See text for definitions of catch-per-unit-effort and standard error.

Common name	MCBU	TWZ
Shovelnose sturgeon	0.00	0.33
	(0.00)	(0.19)
Speckled chub	0.42	0.00
	(0.20)	(0.00)
Silver chub	0.04	0.00
	(0.04)	(0.00)
Bullhead minnow	0.04	0.00
	(0.04)	(0.00)
Channel catfish	12.71	0.67
	(5.90)	(0.28)
Stonecat	0.00	0.00
	(0.00)	(0.00)
Tadpole madtom	0.00	0.08
	(0.00)	(0.08)
Flathead catfish	0.04	0.17
	(0.04)	(0.11)
White bass	0.00	0.17
	(0.00)	(0.11)
Largemouth bass	0.04	0.00
	(0.04)	(0.00)
Freshwater drum	1.42	6.33
	(0.57)	(2.72)

Strata: BWCS - Backwater, contiguous, shoreline
BWCO - Backwater, contiguous, offshore
IMPS - Impounded, shoreline
IMPO - Impounded, offshore
MCBU - Main channel border, unstructured
MCBW - Main channel border, wing dam
SCB - Side channel boarder
CTR - Main channel trough
TWZ - Tailwater

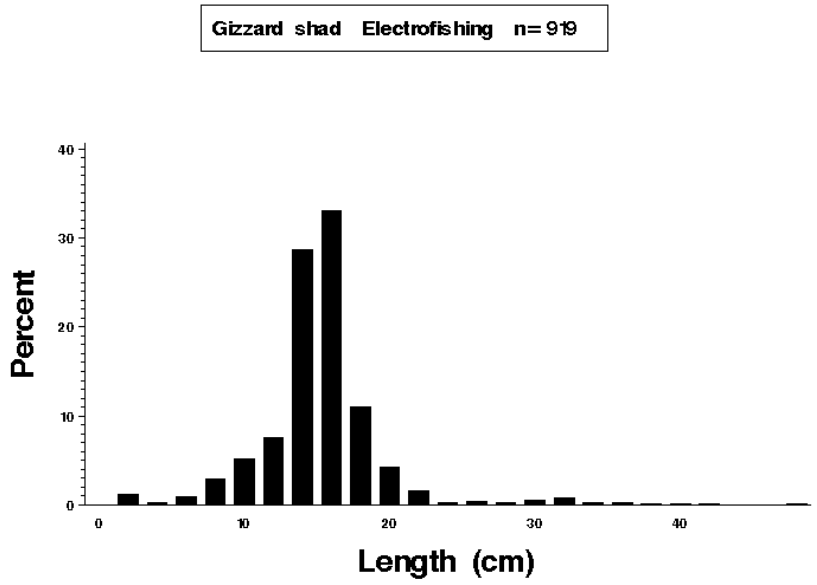

Figure 3.2. Length distributions (*length*) as a percentage of catch (*percent*) for gizzard shad (*Dorosoma cepedianum*) collected by electrofishing in Upper Mississippi River Pool 13 during 1991.

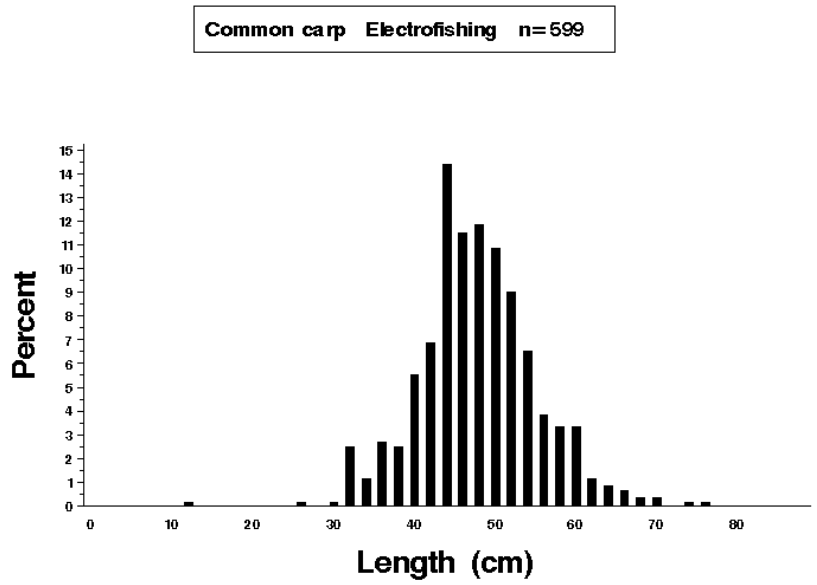

Figure 3.3. Length distributions (*length*) as a percentage of catch (*percent*) for common carp (*Cyprinus carpio*) collected by electrofishing in Upper Mississippi River Pool 13 during 1991.

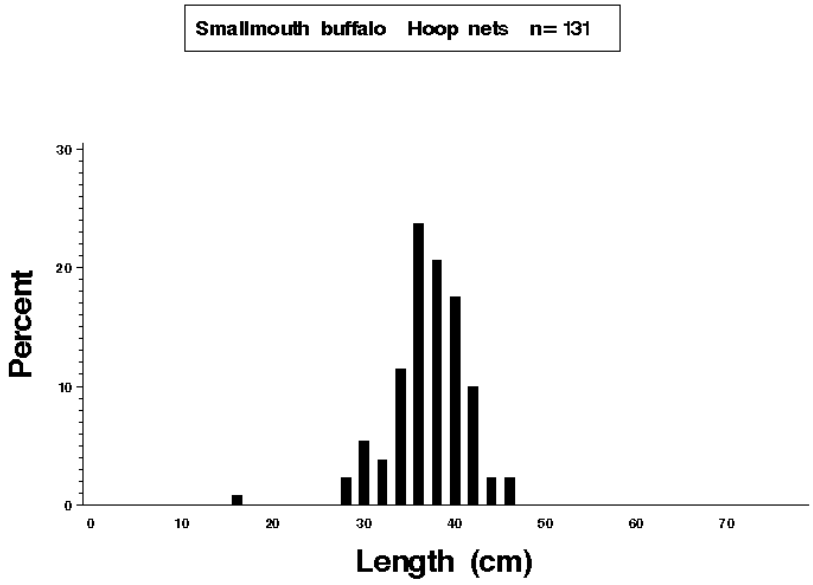

Figure 3.4. Length distributions (*length*) as a percentage of catch (*percent*) for smallmouth buffalo (*Ictiobus bubalus*) collected by electrofishing in Upper Mississippi River Pool 13 during 1991.

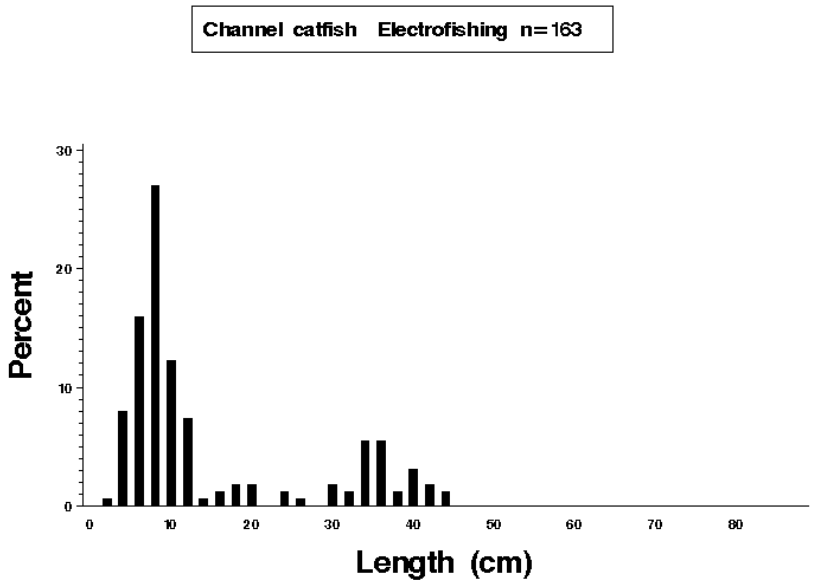

Figure 3.5. Length distributions (*length*) as a percentage of catch (*percent*) for channel catfish (*Ictalurus punctatus*) collected by electrofishing in Upper Mississippi River Pool 13 during 1991.

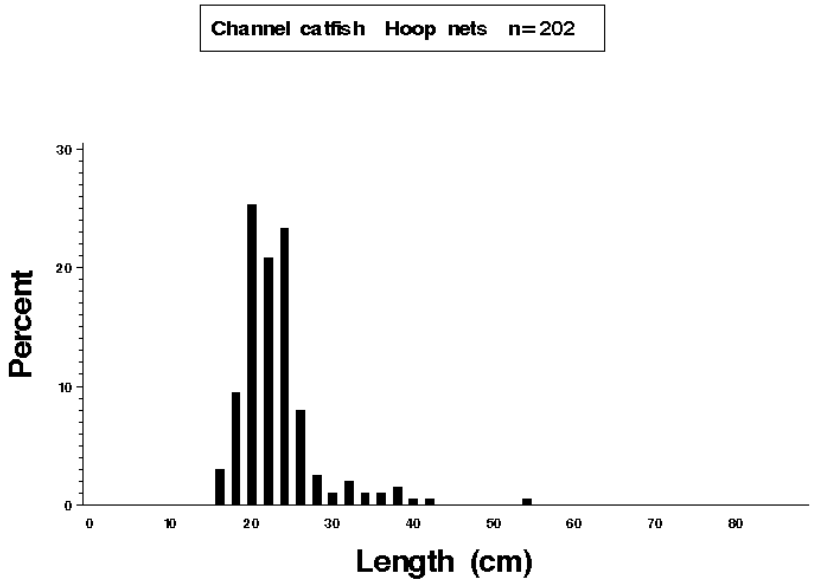

Figure 3.6. Length distributions (*length*) as a percentage of catch (*percent*) for channel catfish (*Ictalurus punctatus*) collected by large and small hoop netting in Upper Mississippi River Pool 13 during 1991.

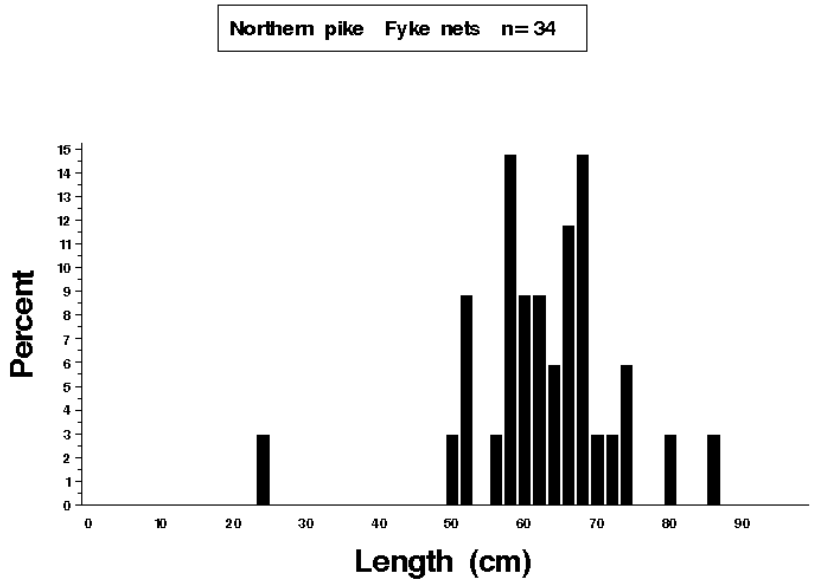

Figure 3.7. Length distributions (*length*) as a percentage of catch (*percent*) for northern pike (*Esox lucius*) collected by fyke netting in Upper Mississippi River Pool 13 during 1991.

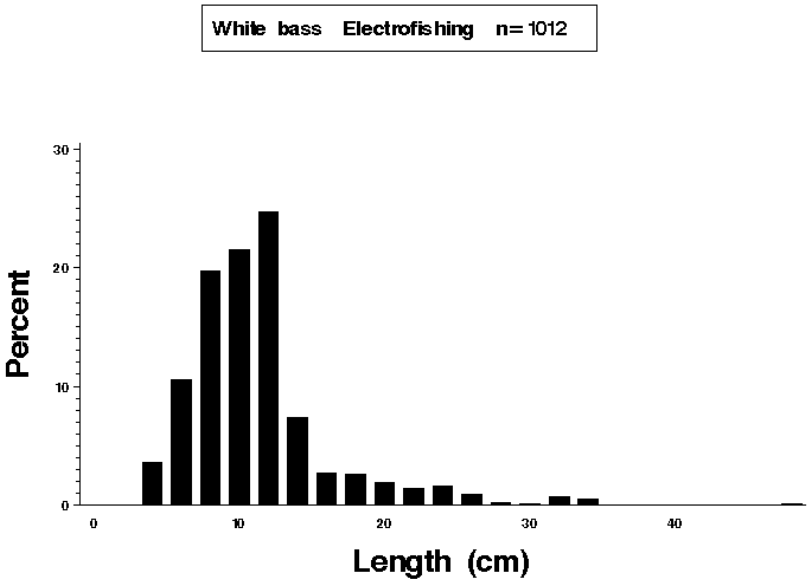

Figure 3.8. Length distributions (*length*) as a percentage of catch (*percent*) for white bass (*Morone chryops*) collected by electrofishing in Upper Mississippi River Pool 13 during 1991.

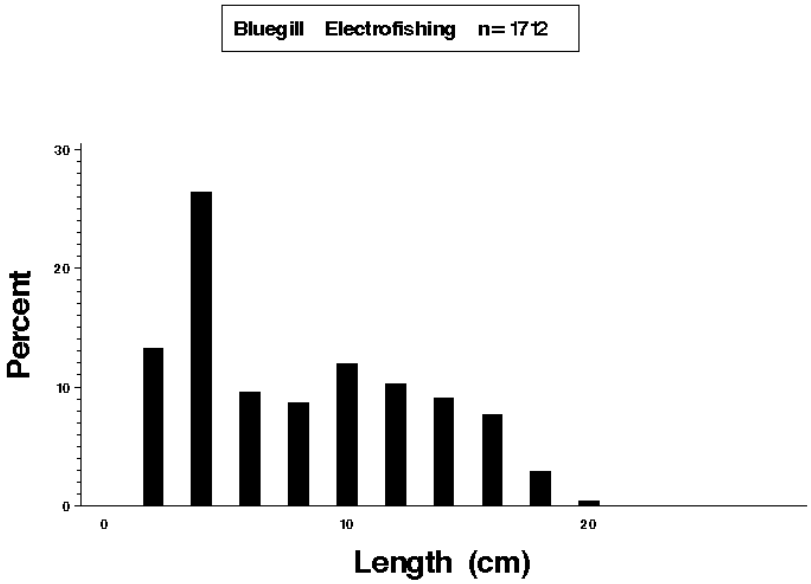

Figure 3.9. Length distributions (*length*) as a percentage of catch (*percent*) for bluegill (*Lepomis macrochirus*) collected by electrofishing in Upper Mississippi River Pool 13 during 1991.

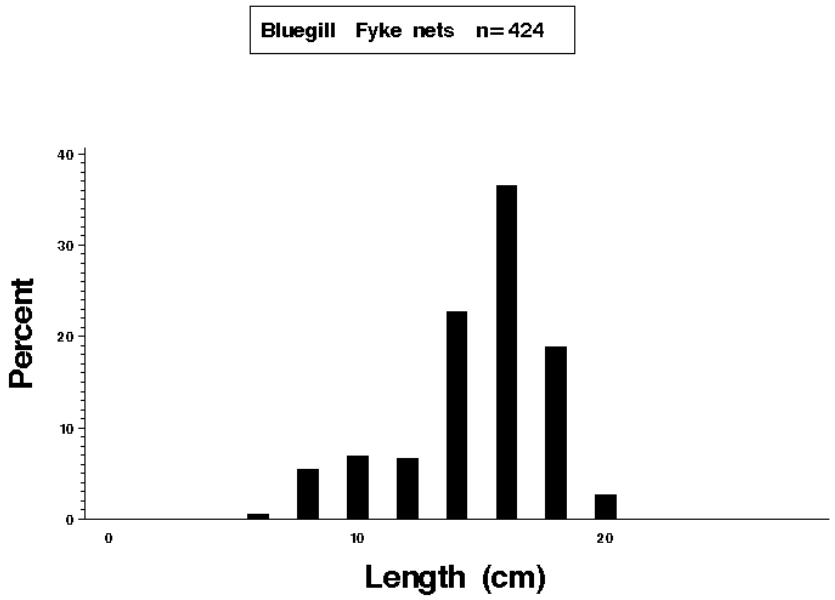

Figure 3.10. Length distributions (*length*) as a percentage of catch (*percent*) for bluegill (*Lepomis macrochirus*) collected by fyke netting in Upper Mississippi River Pool 13 during 1991.

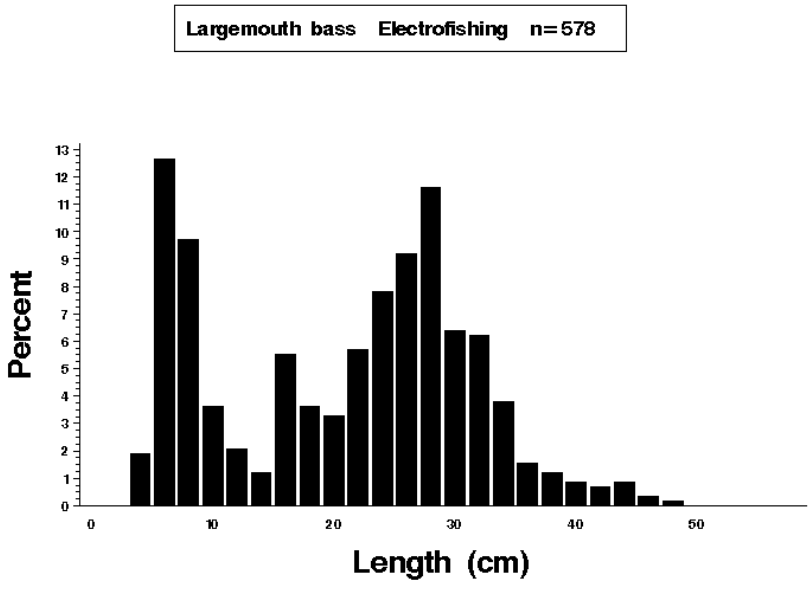

Figure 3.11. Length distributions (*length*) as a percentage of catch (*percent*) for largemouth bass (*Micropterus salmoides*) collected by electrofishing in Upper Mississippi River Pool 13 during 1991.

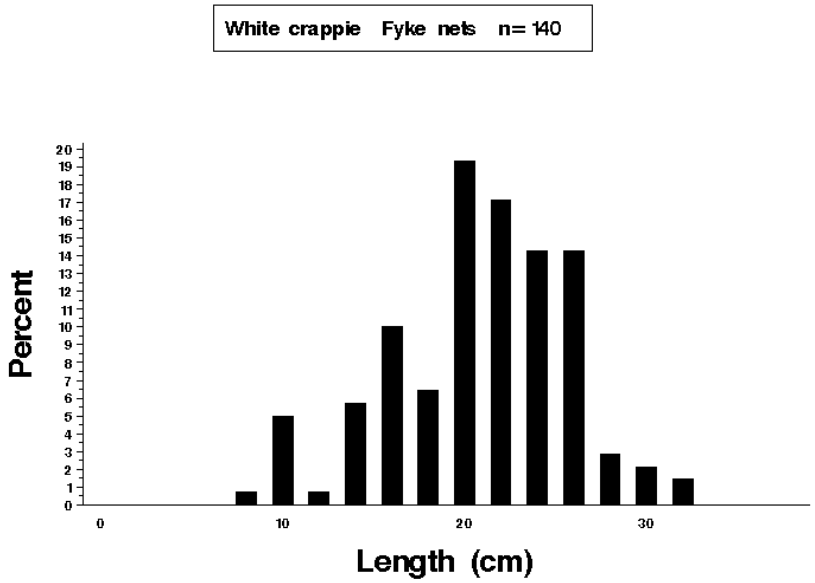

Figure 3.12. Length distributions (*length*) as a percentage of catch (*percent*) for white crappie (*Pomoxis annularus*) collected by fyke netting in Upper Mississippi River Pool 13 during 1991.

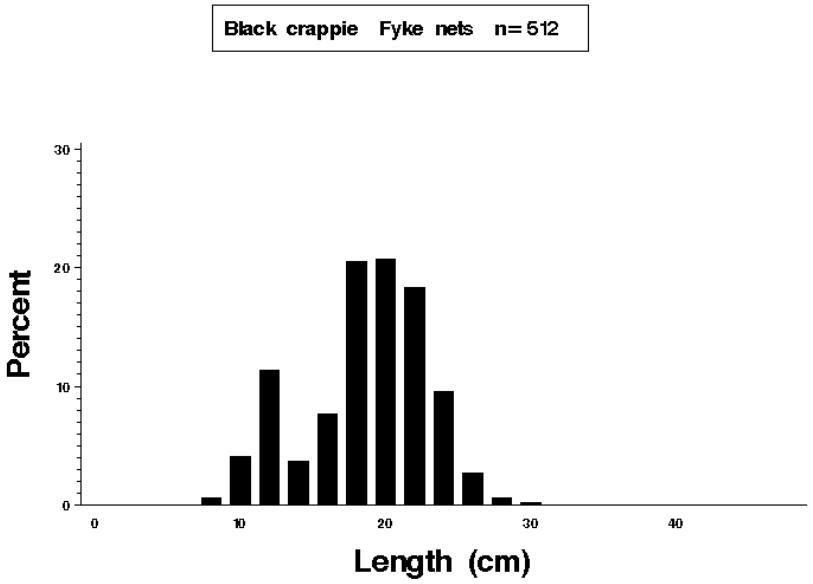

Figure 3.13. Length distributions (*length*) as a percentage of catch (*percent*) for black crappie (*Pomoxis nigromaculatus*) collected by fyke netting in Upper Mississippi River Pool 13 during 1991.

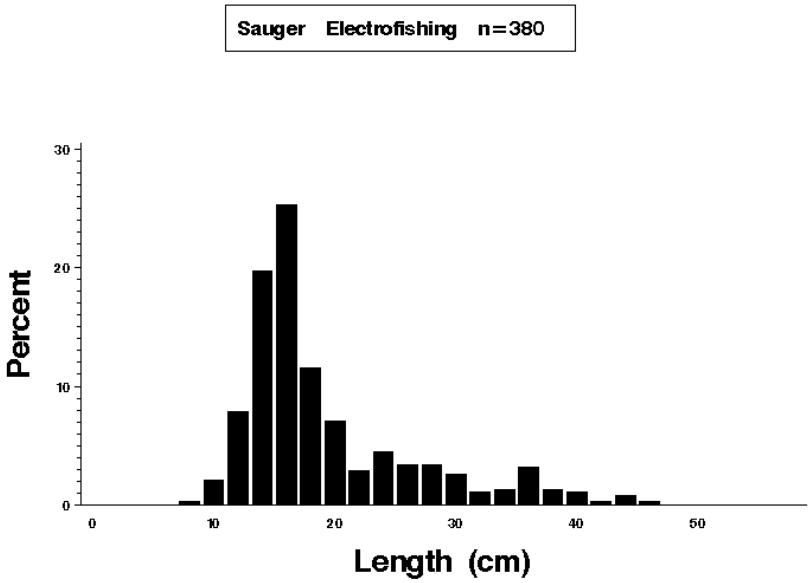

Figure 3.14. Length distributions (*length*) as a percentage of catch (*percent*) for sauger (*Stizostedion canadense*) collected by electrofishing in Upper Mississippi River Pool 13 during 1991.

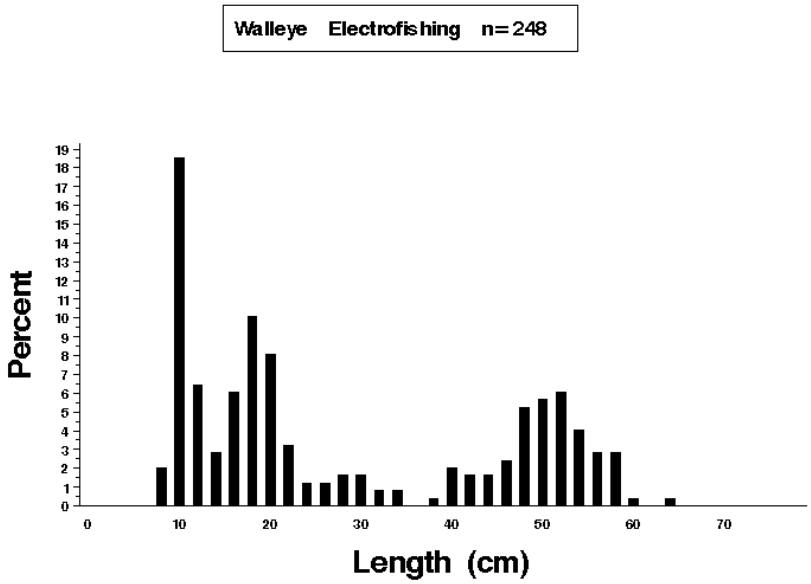

Figure 3.15. Length distributions (*length*) as a percentage of catch (*percent*) for walleye (*Stizostedion vitreum*) collected by electrofishing in Upper Mississippi River Pool 13 during 1991.

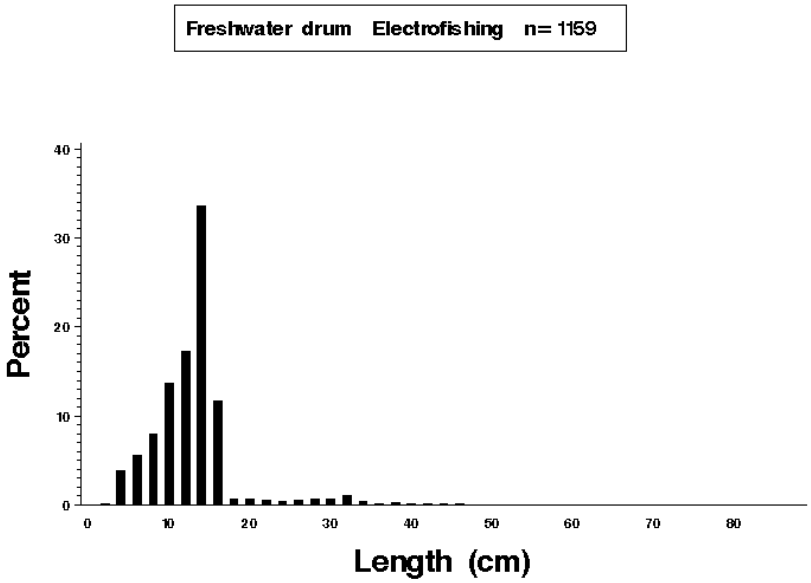

Figure 3.16. Length distributions (*length*) as a percentage of catch (*percent*) for freshwater drum (*Aplodinotus grunniens*) collected by electrofishing in Upper Mississippi River Pool 13 during 1991.

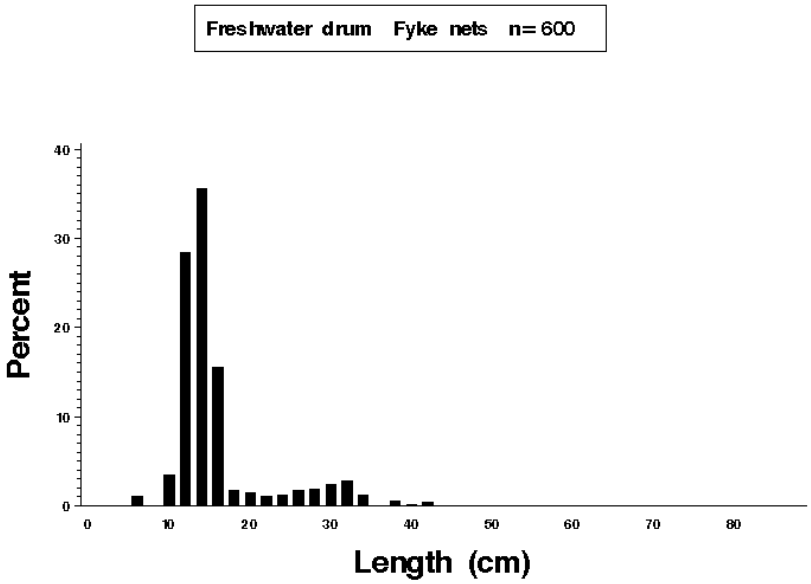

Figure 3.17. Length distributions (*length*) as a percentage of catch (*percent*) for freshwater drum (*Aplodinotus grunniens*) collected by fyke netting in Upper Mississippi River Pool 13 during 1991.

Chapter 4. Pool 26, Upper Mississippi River

by

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Hydrograph

Water levels at Pool 26 are influenced by discharge from the Mississippi, Illinois, and Missouri Rivers. The pool is regulated at a midpool control point by the U.S. Army Corps of Engineers. These factors combine to give Pool 26 a highly fluctuating hydrologic regime. Three sets of hydrographs are shown to accurately represent these fluctuations (Figure 4.1). Gages are located at Lock and Dam 25 tailwater (Winfield Gage), midreach (Grafton Gage), and Lock and Dam 26 impoundment (Alton Gage). Each graph shows 1940–90 daily means and 1991 daily water levels. The Winfield Gage shows 1991 water levels close to the mean, except in spring and early summer. High water levels during these periods caused some minor sampling problems. The Grafton Gage shows a more stable pattern, with high water in spring then dropping and stabilizing by the middle of June. The Alton Gage shows extensive low water periods (drawdowns). These drawdowns dominated March through June causing sampling problems and completely drying some backwaters in the lower portion of Reach 26.

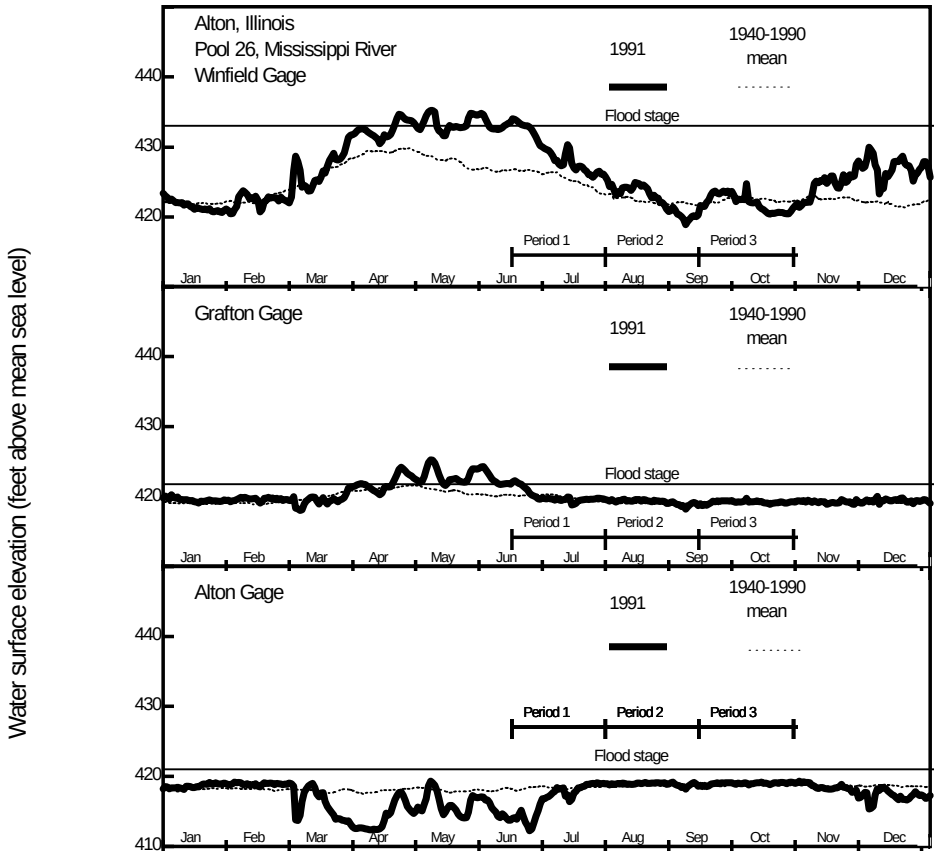

Figure 4.1. Daily water surface elevation from Winfield, Grafton, and Alton Gages for Pool 26, Upper Mississippi River, during 1991 and mean elevation since 1940. Discharge data were obtained from the U.S. Army Corps of Engineers, St. Louis District.

Summary of Sampling Effort

We collected 316 samples from fixed sites using nine gears in 1991 (Table 4.1). We collected 98 samples in the first period, 110 in the second, and 108 in the third. The greatest effort (84 samples) was expended in the BWCS stratum. The least effort (24 samples) was in the SCB stratum.

Total Catch by Gear

We collected 27,797 fish of 66 species and one hybrid (green sunfish × bluegill) during the 1991 field season (Table 4.2). The five most abundant species were the gizzard shad (9,346), bluegill (7,803), white bass (1,507), black crappie (1,075), and freshwater drum (885). The total number of fish and species—excluding hybrids—collected by gear were day electrofishing, 4,584 fish of 51 species; night electrofishing, 3,716 fish of 46 species; fyke netting, 4,604 fish of 34 species; tandem fyke netting, 1,484 fish of 27 species; mini fyke netting, 5,764 fish of 42 species; tandem mini fyke netting, 6,300 fish of 18 species; seining, 234 fish of 11 species; tandem hoop nets, 812 fish of 17 species; and trawling, 299 fish of 12 species. Twelve species were collected in 1991 that had not previously been collected in LTRMP samples (1989 and 1990). These species were the chestnut lamprey, lake sturgeon, central stoneroller, grass carp, bighead carp, silverband shiner, bluntnose minnow, black buffalo, tadpole madtom, freckled madtom, mud darter, and logperch.

Fixed Sampling, Mean *C/f* by Gear and Stratum

Day Electrofishing

For day electrofishing (Table 4.3.1), gizzard shad had the highest *C/f* in the BWCS stratum (30.38), followed by bluegill (7.87) and freshwater drum (4.67). Bluegill had the highest *C/f* in the IMPS stratum (74.65), followed by gizzard shad (14.28) and green sunfish (9.87). Gizzard shad had the highest *C/f* in the MCBU stratum (38.38), followed by common carp (8.76) and channel catfish (7.64). Gizzard shad had the highest *C/f* in the MCBW stratum (49.47), followed by threadfin shad (6.12) and common carp (5.95).

Night Electrofishing

For night electrofishing (Table 4.3.2), gizzard shad had the highest *C/f* in the BWCS stratum (47.95), followed by bluegill (12.48) and freshwater drum (11.63). Gizzard shad also had the highest *C/f* in the MCBU stratum (26.45), followed by freshwater drum (7.94) and common carp (7.82). Common carp had the highest *C/f* in the SCB stratum (12.40), followed by freshwater drum (9.35) and gizzard shad (8.88). Gizzard shad had the highest *C/f* in the TWZ stratum (85.67), followed by white bass (18.25) and common carp (15.65).

Fyke Net

For fyke netting (Table 4.3.3), white bass had the highest *C/f* in the BWCS stratum (16.86), followed by bluegill (16.13) and shortnose gar (15.39). Bluegill had the highest *C/f* in the IMPS stratum (135.60), followed by black crappie (35.12) and shortnose gar (6.98). White bass had the highest *C/f* in the MCBW stratum (12.02), followed by threadfin shad (6.49) and freshwater drum (5.60). White bass had the highest *C/f* in the TWZ stratum (73.69), followed by black crappie (72.95) and bluegill (36.90).

Tandem Fyke Net

For tandem fyke netting (Table 4.3.4), IMPO was the only stratum sampled. Bluegill had the highest *C/f* (84.90), followed by black crappie (19.70) and white bass (13.00).

Mini Fyke Net

For mini fyke netting (Table 4.3.5), the three highest *C/f*s by stratum were BWCS (bluegill, 158.14; red shiner, 7.05; western mosquitofish, 6.96), IMPS (bluegill, 41.27; orangespotted sunfish, 21.00; golden shiner, 13.64), MCBW (bluegill, 6.06; river shiner, 5.22; red shiner, 3.17), and TWZ (emerald shiner, 9.51; white bass, 8.81; red shiner, 3.91)

Tandem Mini Fyke Net

For tandem mini fyke netting (Table 4.3.6), IMPO was the only stratum sampled. Gizzard shad had the highest *C/f* (493.34), followed by bullhead minnow (25.64) and bluegill (10.51).

Tandem Hoop Nets

For tandem hoop netting (Table 4.3.7), the highest *C/f*s by stratum were MCBU (smallmouth buffalo, 3.53; channel catfish, 1.27; freshwater drum, 0.72), MCBW (freshwater drum, 3.25; smallmouth buffalo, 2.52; common carp, 0.85), SCB (channel catfish, 6.60; smallmouth buffalo, 3.97; common carp, 1.23), and TWZ (smallmouth buffalo, 14.99; channel catfish, 2.44; river carpsucker, 1.29).

Seine

For seining (Table 4.3.8), MCBU was the only stratum sampled. Gizzard shad had the highest *C/f* (13.40), followed by emerald shiner (3.90) and channel catfish (3.00).

Trawl

For trawling (Table 4.3.9), the highest *C/f*s by stratum were MCBU (channel catfish, 1.71; speckled chub, 0.21; river shiner, 0.13; freshwater drum, 0.13), CTR (channel catfish, 1.36; freshwater drum, 1.03; shovelnose sturgeon, 0.22), and TWZ (freshwater drum, 5.67; channel catfish, 4.50; shovelnose sturgeon, 1.25).

Length Distributions of Selected Species

Length distributions are presented for selected species in Figures 4.2 to 4.15. The length distributions for some gears may be limited by the size selectiveness of the particular gear. Length distributions from small samples ($n < 100$) may be included but are not statistically meaningful (Anderson and Neumann 1996).

Gizzard Shad

The electrofishing length distribution for 3,152 gizzard shad (Figure 4.2) shows a mode of 10 cm and fish as long as 36 cm.

Common Carp

The electrofishing length distribution for 611 common carp (Figure 4.3) shows at least three length groups; one of fish between 2 and 8 cm, one of fish between 20 and 34 cm, and one of fish near 50 cm.

Smallmouth Buffalo

The electrofishing length distribution for 89 smallmouth buffalo (Figure 4.4) shows a mode of 28 cm and fish ranging from 4 to 46 cm. The hoop net length distribution for 389 smallmouth buffalo (Figure 4.5) shows more large fish, mostly between 30 and 50 cm, with a mode of 36 cm.

Channel Catfish

The electrofishing length distribution for 356 channel catfish (Figure 4.6) appears bimodal. The first group probably represents age 0 fish, with a mode of 6 cm. The second group represents larger fish between 16 and 66 cm, with a mode of 40 cm. The hoop net length distribution for 205 channel catfish (Figure 4.7) shows a mode of 32 cm, with fish ranging from 10 to 52 cm.

White Bass

The electrofishing length distribution for 400 white bass (Figure 4.8) shows a mode of 12 cm, with fish ranging from 2 to 42 cm.

Bluegill

The electrofishing length distribution for 1,371 bluegill (Figure 4.9) shows an even distribution between 0 and 18 cm, with a mode of 10 cm. The fyke net length distribution for 2,279 bluegill (Figure 4.10) also shows a mode of 10 cm.

Largemouth Bass

The electrofishing length distribution for 65 largemouth bass (Figure 4.11) shows fish ranging from 10 to 42 cm, with a mode of 26 cm.

White Crappie

The fyke netting length distribution for 242 white crappie (Figure 4.13) shows fish ranging from 8 to 32 cm, with a mode of 16 cm.

Black Crappie

The fyke netting length distribution for 927 black crappie (Figure 4.12) shows fish ranging from 8 to 30 cm, with a mode of 14 cm.

Sauger

The electrofishing length distribution for 45 sauger (Figure 4.14) shows a mode of 34 cm, with fish ranging from 6 to 46 cm.

Freshwater Drum

The electrofishing length distribution for 575 freshwater drum (Figure 4.15) shows a high percentage of age 0 fish, with a mode of 6 cm and range of 2 to 48 cm.

Table 4.1. Allocation of fish sampling effort among strata by the Long Term Resource Monitoring Program in Pool 26 of the Mississippi River during 1991. Table entries are numbers of successfully completed standardized monitoring collections.

Sampling period = 1: June 15 - July 31

Sampling gear	BWCS	BWCO	SCB	MCBU	MCBW	IMPS	IMPO	CTR	TWZ	TOTAL
Day electrofishing	8			4	2	4				18
Fyke net	8				2	2				12
Tandem hoop net			4	4	2				2	12
Mini fyke net	8				2	2				12
Night electrofishing	4		4	4					2	14
Seine				2						2
Trawling				8				12	4	24
Tandem fyke net							2			2
Tandem mini fyke net							2			2
SUBTOTAL	28	0	8	22	8	8	4	12	8	98

Sampling period = 2: August 1 - September 14

Sampling gear	BWCS	BWCO	SCB	MCBU	MCBW	IMPS	IMPO	CTR	TWZ	TOTAL
Day electrofishing	8			4	4	4				20
Fyke net	8				4	2			2	16
Tandem hoop net			4	4	4				2	14
Mini fyke net	8				2	2			2	14
Night electrofishing	4		4	4					2	14
Seine				4						4
Trawling				8				12	4	24
Tandem fyke net							2			2
Tandem mini fyke net							2			2
SUBTOTAL	28	0	8	24	14	8	4	12	12	110

Sampling period = 3: September 15 - October 31

Sampling gear	BWCS	BWCO	SCB	MCBU	MCBW	IMPS	IMPO	CTR	TWZ	TOTAL
Day electrofishing	8			4	2	4				18
Fyke net	8				4	2			2	16
Tandem hoop net			4	4	2				2	12
Mini fyke net	8				4	2			2	16
Night electrofishing	4		4	4					2	14
Seine				4						4
Trawling				8				12	4	24
Tandem fyke net							2			2
Tandem mini fyke net							2			2
SUBTOTAL	28	0	8	24	12	8	4	12	12	108
	84	0	24	70	34	24	12	36	32	316

Strata: BWCS - Backwater, contiguous, shoreline.
BWCO - Backwater, contiguous, offshore.
IMPS - Impounded, shoreline.
IMPO - Impounded, offshore.
MCBU - Main channel border, unstructured.
MCBW - Main channel border, wing dam.
SCB - Side channel border.
CTR - Main channel trough.
TWZ - Tailwater.

Table 4.2. Total catches, by gear type, of fishes collected by the Long Term Resource Program during 1991 in Pool 26 of the Mississippi River. See Table 4.1 for the list of sampling gears actually deployed in this study reach.

Species	Common name	Scientific name	D	N	F	X	M	Y	S	H	T	TOTAL
1	Chestnut lamprey	Ichthyomyzon castaneus	1	1	-	-	-	-	-	-	-	2
2	Lake sturgeon	Acipenser fulvescens	-	-	-	-	-	-	-	-	1	1
3	Shovelnose sturgeon	Scaphirhynchus platorynchus	-	-	-	-	-	-	-	-	25	25
4	Spotted gar	Lepisosteus oculatus	-	4	19	1	1	-	-	-	-	25
5	Longnose gar	Lepisosteus osseus	3	3	7	1	7	4	-	-	-	25
6	Shortnose gar	Lepisosteus platostomus	35	85	488	50	39	-	-	2	-	699
7	Bowfin	Amia calva	2	2	7	-	1	-	-	-	-	12
8	Goldeye	Hiodon alosoides	-	1	-	-	-	-	-	-	-	1
9	Mooneye	Hiodon tergisus	1	-	1	-	-	-	-	1	-	3
10	American eel	Anguilla rostrata	1	-	-	-	-	-	-	-	-	1
11	Skipjack herring	Alosa chrysochloris	36	1	3	2	3	-	-	1	-	4
12	Gizzard shad	Dorosoma cepedianum	1643	1510	148	17	81	5803	134	9	1	9346
13	Threadfin shad	Dorosoma petenense	161	48	166	12	16	11	-	-	-	414
14	Central stoneroller	Campostoma anomalum	1	-	-	-	1	1	-	-	-	3
15	Goldfish	Carassius auratus	1	1	5	1	-	-	-	-	-	8
16	Grass carp	Ctenopharyngodon idella	1	-	-	1	-	-	-	-	-	2
17	Red shiner	Cyprinella lutrensis	23	2	-	-	214	-	2	-	-	241
18	Spotfin shiner	Cyprinella spiloptera	1	1	-	-	1	-	-	-	-	3
19	Common carp	Cyprinus carpio	240	371	132	15	26	-	1	51	1	837
20	Bighead carp	Hypopthalmichthys nobilis	1	-	-	-	-	-	-	-	-	1
21	Speckled chub	Macrhybopsis aestivalis	-	-	-	-	-	-	-	-	5	5
22	Silver chub	Macrhybopsis storeriana	5	7	-	-	16	-	-	-	-	28
23	Golden shiner	Notemigonus crysoleucas	-	2	2	-	76	1	-	-	-	81
24	Emerald shiner	Notropis atherinoides	60	62	-	-	135	-	39	-	-	296
25	River shiner	Notropis blennius	55	11	-	-	232	-	12	-	3	313
26	Ghost shiner	Notropis buchanani	-	4	-	-	23	-	-	-	-	27
27	Silverband shiner	Notropis shumardi	1	-	-	-	3	-	-	-	-	4
28	Sand shiner	Notropis stramineus	-	1	-	-	1	-	-	-	-	2
29	Mimic shiner	Notropis volucellus	-	1	-	-	1	-	1	-	-	3
30	Suckermouth minnow	Phenacobius mirabilis	1	-	-	-	3	-	-	-	-	4
31	Bluntnose minnow	Pimephales notatus	-	-	-	-	3	-	-	-	-	3
32	Bullhead minnow	Pimephales vigilax	59	33	-	-	162	277	-	-	-	531
33	River carpsucker	Carpiodes carpio	80	141	203	23	9	-	1	49	2	508
34	Quillback	Carpiodes cyprinus	2	2	13	2	-	-	-	4	-	23
35	Highfin carpsucker	Carpiodes velifer	1	-	-	-	-	-	-	-	-	1
36	Smallmouth buffalo	Ictiobus bubalus	38	51	32	9	18	-	-	389	-	537
37	Bigmouth buffalo	Ictiobus cyprinellus	22	21	3	-	-	-	-	2	-	48
38	Black buffalo	Ictiobus niger	3	2	-	-	-	-	-	-	-	5
39	Golden redhorse	Moxostoma erythrurum	-	-	3	-	-	-	-	-	-	3
40	Shorthead redhorse	Moxostoma macrolepidotum	4	5	2	5	-	-	-	1	1	18

Gears: D - Day electrofishing
N - Night electrofishing
F - Fyke netting
M - Mini fyke netting
T - Trawling (4.8-m bottom trawl)
S - Seining
H - Small and large hoop netting
X - Tandem fyke netting
Y - Tandem mini fyke netting

Table 4.2. Total catches, by gear type, of fishes collected by the Long Term Resource Program during 1991 in Pool 26 of the Mississippi River. See Table 4.1 for the list of sampling gears actually deployed in this study reach.

Species	Common name	Scientific name	D	N	F	X	M	Y	S	H	T	TOTAL
41	Black bullhead	Ameiurus melas	12	-	19	9	1	2	-	1	-	44
42	Yellow bullhead	Ameiurus natalis	11	2	5	1	-	-	-	-	-	19
43	Brown bullhead	Ameiurus nebulosus	3	-	1	3	-	-	-	-	-	7
44	Blue catfish	Ictalurus furcatus	-	-	-	-	-	-	-	1	5	6
45	Channel catfish	Ictalurus punctatus	204	152	7	1	28	-	30	205	144	771
46	Tadpole madtom	Noturus gyrinus	-	-	-	-	10	-	-	-	-	10
47	Freckled madtom	Noturus nocturnus	1	-	-	-	-	-	-	-	-	1
48	Flathead catfish	Pylodictis olivaris	24	16	3	-	-	-	-	14	3	60
49	Blackstripe topminnow	Fundulus notatus	-	1	-	-	-	-	-	-	-	1
50	Western mosquitofish	Gambusia affinis	1	3	-	-	169	1	-	-	-	174
51	Brook silverside	Labidesthes sicculus	8	17	-	-	5	1	6	-	-	37
52	White bass	Morone chrysops	152	248	857	156	76	4	7	7	-	1507
53	Yellow bass	Morone mississippiensis	4	59	49	1	3	-	-	-	-	116
54	Green sunfish	Lepomis cyanellus	132	2	1	-	24	4	-	-	-	163
55	Warmouth	Lepomis gulosus	43	1	1	4	12	5	-	-	-	66
56	Orangespotted sunfish	Lepomis humilis	19	65	2	2	153	59	-	-	-	300
57	Bluegill	Lepomis macrochirus	1122	249	1379	900	4031	120	-	2	-	7803
58	Green sunfish x bluegill	L. cyanellus x L. macrochirus	4	-	1	-	-	-	-	-	-	5
59	Largemouth bass	Micropterus salmoides	74	66	21	2	4	-	-	-	-	167
60	White crappie	Pomoxis annularis	33	13	184	58	71	2	-	-	-	361
61	Black crappie	Pomoxis nigromaculatus	42	27	723	204	78	1	-	-	-	1075
62	Mud darter	Etheostoma asprigene	-	-	-	-	1	-	-	-	-	1
63	Logperch	Percina caprodes	4	-	-	-	1	-	-	-	-	5
64	Slenderhead darter	Percina phoxocephala	3	1	-	-	-	-	-	-	-	4
65	Sauger	Stizostedion canadense	7	38	20	1	1	-	-	-	-	67
66	Walleye	Stizostedion vitreum	1	4	1	-	-	1	-	-	-	7
67	Freshwater drum	Aplodinotus grunniens	198	379	96	3	24	3	1	73	108	885
			4584	3716	4604	1484	5764	6300	234	812	299	27797

Gears: D - Day electrofishing
N - Night electrofishing
F - Fyke netting
M - Mini fyke netting
T - Trawling (4.8-m bottom trawl)
S - Seining
H - Small and large hoop netting
X - Tandem fyke netting
Y - Tandem mini fyke netting

Table 4.3.1. Mean catch-per-unit-effort and (standard error) for fishes collected by using day electrofishing in Pool 26 of the Mississippi River using fixed-site sampling during 1991. See text for definitions of catch-per-unit-effort and standard error.

Common name	BWCS	IMPS	MCBU	MCBW
Chestnut lamprey	0.00	0.00	0.09	0.00
	(0.00)	(0.00)	(0.09)	(0.00)
Longnose gar	0.08	0.08	0.00	0.00
	(0.06)	(0.08)	(0.00)	(0.00)
Shortnose gar	1.18	0.08	0.38	0.37
	(0.49)	(0.08)	(0.22)	(0.18)
Bowfin	0.08	0.00	0.00	0.00
	(0.06)	(0.00)	(0.00)	(0.00)
Mooneye	0.04	0.00	0.00	0.00
	(0.04)	(0.00)	(0.00)	(0.00)
American eel	0.00	0.00	0.10	0.00
	(0.00)	(0.00)	(0.10)	(0.00)
Skipjack herring	0.17	0.51	0.19	2.96
	(0.08)	(0.15)	(0.13)	(2.07)
Gizzard shad	30.38	14.28	38.38	49.47
	(7.50)	(7.16)	(22.58)	(15.46)
Threadfin shad	3.85	1.45	0.84	6.12
	(1.08)	(0.82)	(0.53)	(3.93)
Central stoneroller	0.04	0.00	0.00	0.00
	(0.04)	(0.00)	(0.00)	(0.00)
Goldfish	0.00	0.08	0.00	0.00
	(0.00)	(0.08)	(0.00)	(0.00)
Grass carp	0.00	0.08	0.00	0.00
	(0.00)	(0.08)	(0.00)	(0.00)
Red shiner	0.95	0.00	0.08	0.17
	(0.86)	(0.00)	(0.08)	(0.17)
Spotfin shiner	0.00	0.00	0.10	0.00
	(0.00)	(0.00)	(0.10)	(0.00)
Common carp	3.57	1.23	8.76	5.95
	(1.25)	(0.63)	(1.96)	(2.63)
Bighead carp	0.00	0.00	0.00	0.13
	(0.00)	(0.00)	(0.00)	(0.13)
Silver chub	0.09	0.00	0.10	0.25
	(0.06)	(0.00)	(0.10)	(0.25)
Emerald shiner	2.28	0.00	0.27	0.53
	(0.91)	(0.00)	(0.14)	(0.28)
River shiner	2.25	0.17	0.00	0.09
	(1.29)	(0.17)	(0.00)	(0.09)
Silverband shiner	0.05	0.00	0.00	0.00
	(0.05)	(0.00)	(0.00)	(0.00)
Suckermouth minnow	0.00	0.00	0.00	0.09
	(0.00)	(0.00)	(0.00)	(0.09)
Bullhead minnow	1.82	1.18	0.08	0.00
	(0.66)	(0.61)	(0.08)	(0.00)
River carpsucker	1.65	1.98	1.72	0.00
	(0.74)	(1.35)	(0.90)	(0.00)
Quillback	0.04	0.09	0.00	0.00
	(0.04)	(0.09)	(0.00)	(0.00)
Highfin carpsucker	0.04	0.00	0.00	0.00
	(0.04)	(0.00)	(0.00)	(0.00)
Smallmouth buffalo	0.58	1.04	0.38	0.96
	(0.25)	(0.53)	(0.22)	(0.33)
Bigmouth buffalo	0.31	0.42	0.08	0.84
	(0.18)	(0.15)	(0.08)	(0.46)
Black buffalo	0.04	0.00	0.10	0.13
	(0.04)	(0.00)	(0.10)	(0.13)
Shorthead redhorse	0.04	0.00	0.00	0.36
	(0.04)	(0.00)	(0.00)	(0.26)
Black bullhead	0.00	1.00	0.00	0.00
	(0.00)	(0.38)	(0.00)	(0.00)

Strata: BWCS - Backwater, contiguous, shoreline
BWCO - Backwater, contiguous, offshore
IMPS - Impounded, shoreline
IMPO - Impounded, offshore
MCBU - Main channel border, unstructured
MCBW - Main channel border, wing am
SCB - Side channel boarder
CTR - Main channel trough
TWZ - Tailwater

Table 4.3.1. Mean catch-per-unit-effort and (standard error) for fishes collected by using day electrofishing in Pool 26 of the Mississippi River using fixed-site sampling during 1991. See text for definitions of catch-per-unit-effort and standard error.

Common name	BWCS	IMPS	MCBU	MCBW
Yellow bullhead	0.00	0.89	0.00	0.00
	(0.00)	(0.34)	(0.00)	(0.00)
Brown bullhead	0.00	0.24	0.00	0.00
	(0.00)	(0.12)	(0.00)	(0.00)
Channel catfish	4.59	0.18	7.64	1.43
	(1.98)	(0.12)	(1.93)	(0.58)
Freckled madtom	0.00	0.00	0.09	0.00
	(0.00)	(0.00)	(0.09)	(0.00)
Flathead catfish	0.13	0.00	0.93	1.12
	(0.07)	(0.00)	(0.36)	(0.57)
Western mosquitofish	0.04	0.00	0.00	0.00
	(0.04)	(0.00)	(0.00)	(0.00)
Brook silverside	0.10	0.24	0.10	0.13
	(0.10)	(0.17)	(0.10)	(0.13)
White bass	3.57	0.57	3.49	3.07
	(1.57)	(0.34)	(0.80)	(0.65)
Yellow bass	0.12	0.00	0.10	0.00
	(0.09)	(0.00)	(0.10)	(0.00)
Green sunfish	0.04	9.87	0.10	1.31
	(0.04)	(3.67)	(0.10)	(0.66)
Warmouth	0.00	3.51	0.00	0.00
	(0.00)	(1.28)	(0.00)	(0.00)
Orangespotted sunfish	0.70	0.17	0.00	0.00
	(0.34)	(0.12)	(0.00)	(0.00)
Bluegill	7.87	74.65	0.44	2.47
	(2.48)	(22.44)	(0.20)	(1.20)
Green sunfish x bluegill	0.00	0.32	0.00	0.00
	(0.00)	(0.22)	(0.00)	(0.00)
Largemouth bass	0.55	3.31	0.25	2.09
	(0.21)	(0.68)	(0.13)	(0.75)
White crappie	0.97	0.00	0.37	0.51
	(0.46)	(0.00)	(0.21)	(0.38)
Black crappie	0.88	1.10	0.27	0.50
	(0.59)	(0.57)	(0.20)	(0.50)
Logperch	0.00	0.16	0.00	0.27
	(0.00)	(0.16)	(0.00)	(0.19)
Slenderhead darter	0.00	0.00	0.19	0.13
	(0.00)	(0.00)	(0.19)	(0.13)
Sauger	0.00	0.42	0.17	0.00
	(0.00)	(0.23)	(0.17)	(0.00)
Walleye	0.00	0.00	0.10	0.00
	(0.00)	(0.00)	(0.10)	(0.00)
Freshwater drum	4.67	0.75	4.86	3.70
	(2.39)	(0.31)	(2.44)	(1.43)

Strata: BWCS - Backwater, contiguous, shoreline
BWCO - Backwater, contiguous, offshore
IMPS - Impounded, shoreline
IMPO - Impounded, offshore
MCBU - Main channel border, unstructured
MCBW - Main channel border, wing dam
SCB - Side channel boarder
CTR - Main channel trough
TWZ - Tailwater

Table 4.3.2. Mean catch-per-unit-effort and (standard error) for fishes collected by using night electrofishing in Pool 26 of the Mississippi River using fixed-site sampling during 1991. See text fo definitions of catch-per-unit-effort and standard error.

Common name	BWCS	MCBU	SCB	TWZ
Chestnut lamprey	0.00	0.08	0.00	0.00
	(0.00)	(0.08)	(0.00)	(0.00)
Spotted gar	0.32	0.00	0.00	0.00
	(0.18)	(0.00)	(0.00)	(0.00)
Longnose gar	0.00	0.08	0.08	0.17
	(0.00)	(0.08)	(0.08)	(0.17)
Shortnose gar	1.59	0.63	1.81	6.27
	(0.56)	(0.32)	(0.74)	(3.27)
Bowfin	0.08	0.00	0.08	0.00
	(0.08)	(0.00)	(0.08)	(0.00)
Goldeye	0.00	0.00	0.08	0.00
	(0.00)	(0.00)	(0.08)	(0.00)
Skipjack herring	0.00	0.00	0.08	0.00
	(0.00)	(0.00)	(0.08)	(0.00)
Gizzard shad	47.95	26.45	8.88	85.67
	(12.84)	(10.01)	(3.93)	(26.06)
Threadfin shad	1.58	1.17	1.23	0.00
	(0.53)	(0.77)	(0.41)	(0.00)
Goldfish	0.08	0.00	0.00	0.00
	(0.08)	(0.00)	(0.00)	(0.00)
Red shiner	0.08	0.00	0.00	0.16
	(0.08)	(0.00)	(0.00)	(0.16)
Spotfin shiner	0.00	0.08	0.00	0.00
	(0.00)	(0.08)	(0.00)	(0.00)
Common carp	2.55	7.82	12.40	15.65
	(0.76)	(2.59)	(2.34)	(5.11)
Silver chub	0.27	0.37	0.00	0.00
	(0.19)	(0.21)	(0.00)	(0.00)
Golden shiner	0.08	0.10	0.00	0.00
	(0.08)	(0.10)	(0.00)	(0.00)
Emerald shiner	0.79	1.52	2.06	1.59
	(0.42)	(0.38)	(0.75)	(0.62)
River shiner	0.45	0.25	0.25	0.00
	(0.28)	(0.13)	(0.18)	(0.00)
Ghost shiner	0.00	0.00	0.32	0.00
	(0.00)	(0.00)	(0.22)	(0.00)
Sand shiner	0.00	0.00	0.00	0.15
	(0.00)	(0.00)	(0.00)	(0.15)
Mimic shiner	0.00	0.00	0.08	0.00
	(0.00)	(0.00)	(0.08)	(0.00)
Bullhead minnow	2.52	0.10	0.00	0.00
	(1.03)	(0.10)	(0.00)	(0.00)
River carpsucker	1.22	7.52	1.85	2.74
	(0.51)	(2.21)	(0.59)	(1.81)
Quillback	0.00	0.19	0.00	0.00
	(0.00)	(0.19)	(0.00)	(0.00)
Smallmouth buffalo	2.18	1.06	0.08	1.67
	(0.81)	(0.50)	(0.08)	(1.01)
Bigmouth buffalo	0.76	0.08	0.73	0.17
	(0.48)	(0.08)	(0.43)	(0.17)
Black buffalo	0.00	0.17	0.00	0.00
	(0.00)	(0.17)	(0.00)	(0.00)
Shorthead redhorse	0.00	0.36	0.09	0.00
	(0.00)	(0.15)	(0.09)	(0.00)
Yellow bullhead	0.00	0.00	0.00	0.33
	(0.00)	(0.00)	(0.00)	(0.33)
Channel catfish	3.22	5.05	4.28	0.98
	(1.31)	(1.04)	(1.33)	(0.63)
Flathead catfish	0.00	0.76	0.41	0.32
	(0.00)	(0.28)	(0.19)	(0.20)

Strata: BWCS - Backwater, contiguous, shoreline MCBU - Main channel border, unstructured
BWO - Backwater, contiguous, offshore MCBW - Main channel border, wing dam
IMPS - Impounded, shoreline SCB - Side channel boarder
IMPO - Impounded, offshore CTR - Main channel trough TWZ - Tailwater

Table 4.3.2. Mean catch-per-unit-effort and (standard error) for fishes collected by using night electrofishing in Pool 26 of the Mississippi River using fixed-site sampling during 1991. See text for definitions of catch-per-unit-effort and standard error.

Common name	BWCS	MCBU	SCB	TWZ
Blackstripe topminnow	0.00	0.10	0.00	0.00
	(0.00)	(0.10)	(0.00)	(0.00)
Western mosquitofish	0.24	0.00	0.00	0.00
	(0.17)	(0.00)	(0.00)	(0.00)
Brook silverside	0.40	0.54	0.49	0.00
	(0.22)	(0.32)	(0.29)	(0.00)
White bass	4.09	4.01	3.31	18.25
	(0.92)	(0.57)	(1.24)	(4.45)
Yellow bass	1.20	0.19	0.33	6.32
	(0.46)	(0.13)	(0.22)	(1.08)
Green sunfish	0.00	0.00	0.17	0.00
	(0.00)	(0.00)	(0.11)	(0.00)
Warmouth	0.07	0.00	0.00	0.00
	(0.07)	(0.00)	(0.00)	(0.00)
Orangespotted sunfish	5.22	0.00	0.00	0.00
	(2.21)	(0.00)	(0.00)	(0.00)
Bluegill	12.48	0.61	0.33	11.99
	(5.88)	(0.23)	(0.26)	(5.32)
Largemouth bass	0.89	0.43	0.08	7.92
	(0.24)	(0.23)	(0.08)	(1.84)
White crappie	0.70	0.08	0.00	0.47
	(0.34)	(0.08)	(0.00)	(0.21)
Black crappie	0.89	0.19	0.00	2.26
	(0.27)	(0.13)	(0.00)	(0.58)
Slenderhead darter	0.00	0.08	0.00	0.00
	(0.00)	(0.08)	(0.00)	(0.00)
Sauger	0.63	1.01	0.08	2.85
	(0.45)	(0.25)	(0.08)	(0.90)
Walleye	0.00	0.08	0.00	0.44
	(0.00)	(0.08)	(0.00)	(0.44)
Freshwater drum	11.63	7.94	9.35	5.82
	(3.23)	(2.01)	(2.00)	(3.50)

Strata: BWCS - Backwater, contiguous, shoreline
BWCO - Backwater, contiguous, offshore
IMPS - Impounded, shoreline
IMPO - Impounded, offshore
MCBU - Main channel border, unstructured
MCBW - Main channel border, wing dam
SCB - Side channel boarder
CTR - Main channel trough
TWZ - Tailwater

Table 4.3.3. Mean catch-per-unit-effort and (standard error) for fishes collected by using fyke netting in Pool 26 of the Mississippi River using fixed-site sampling during 1991. See text for definitions of catch-per-unit-effort and standard error.

Common name	BWCS	IMPS	MCBW	TWZ
Spotted gar	0.54	1.21	0.00	0.00
	(0.29)	(0.70)	(0.00)	(0.00)
Longnose gar	0.08	0.31	0.00	0.77
	(0.06)	(0.20)	(0.00)	(0.77)
Shortnose gar	15.39	6.98	2.30	15.24
	(2.55)	(3.00)	(1.03)	(5.91)
Bowfin	0.27	0.00	0.10	0.00
	(0.12)	(0.00)	(0.10)	(0.00)
Mooneye	0.04	0.00	0.00	0.00
	(0.04)	(0.00)	(0.00)	(0.00)
Skipjack herring	0.00	0.15	0.00	0.50
	(0.00)	(0.15)	(0.00)	(0.29)
Gizzard shad	3.61	1.11	2.60	9.96
	(2.07)	(0.92)	(1.03)	(4.00)
Threadfin shad	3.15	3.01	6.49	2.35
	(1.39)	(0.89)	(5.02)	(1.71)
Goldfish	0.13	0.16	0.00	0.26
	(0.07)	(0.16)	(0.00)	(0.26)
Common carp	4.59	2.39	0.10	3.57
	(1.65)	(0.91)	(0.10)	(2.55)
Golden shiner	0.00	0.31	0.00	0.00
	(0.00)	(0.31)	(0.00)	(0.00)
River carpsucker	6.10	2.66	0.95	9.77
	(1.92)	(1.40)	(0.49)	(5.34)
Quillback	0.13	1.08	0.00	0.98
	(0.13)	(0.74)	(0.00)	(0.57)
Smallmouth buffalo	0.95	0.34	0.00	2.02
	(0.29)	(0.21)	(0.00)	(1.72)
Bigmouth buffalo	0.14	0.00	0.00	0.00
	(0.10)	(0.00)	(0.00)	(0.00)
Golden redhorse	0.04	0.00	0.10	0.26
	(0.04)	(0.00)	(0.10)	(0.26)
Shorthead redhorse	0.09	0.00	0.00	0.00
	(0.06)	(0.00)	(0.00)	(0.00)
Black bullhead	0.00	0.31	0.00	4.32
	(0.00)	(0.31)	(0.00)	(4.01)
Yellow bullhead	0.10	0.00	0.00	0.74
	(0.10)	(0.00)	(0.00)	(0.49)
Brown bullhead	0.00	0.15	0.00	0.00
	(0.00)	(0.15)	(0.00)	(0.00)
Channel catfish	0.20	0.00	0.10	0.26
	(0.10)	(0.00)	(0.10)	(0.26)
Flathead catfish	0.00	0.00	0.00	0.79
	(0.00)	(0.00)	(0.00)	(0.51)
White bass	16.86	5.66	12.02	73.69
	(3.43)	(1.77)	(3.14)	(39.43)
Yellow bass	0.60	0.16	0.00	8.57
	(0.20)	(0.16)	(0.00)	(7.09)
Green sunfish	0.00	0.17	0.00	0.00
	(0.00)	(0.17)	(0.00)	(0.00)
Warmouth	0.00	0.18	0.00	0.00
	(0.00)	(0.18)	(0.00)	(0.00)
Orangespotted sunfish	0.00	0.36	0.00	0.00
	(0.00)	(0.36)	(0.00)	(0.00)
Bluegill	16.13	135.60	5.58	36.90
	(5.23)	(57.77)	(1.20)	(9.13)
Green sunfish x bluegill	0.00	0.18	0.00	0.00
	(0.00)	(0.18)	(0.00)	(0.00)
Largemouth bass	0.64	0.18	0.10	1.25
	(0.35)	(0.18)	(0.10)	(0.97)

Strata: BWCS - Backwater, contiguous, shoreline
BWCO - Backwater, contiguous, offshore
IMPS - Impounded, shoreline
IMPO - Impounded, offshore
MCBU - Main channel border, unstructured
MCBW - Main channel border, wing dam
SCB - Side channel boarder
CTR - Main channel trough
TWZ - Tailwater

Table 4.3.3. Mean catch-per-unit-effort and (standard error) for fishes collected by using fyke netting in Pool 26 of the Mississippi River using fixed-site sampling during 1991. See text for definitions of catch-per-unit-effort and standard error.

Common name	BWCS	IMPS	MCBW	TWZ
White crappie	4.30	0.50	0.94	17.93
	(1.02)	(0.22)	(0.45)	(7.52)
Black crappie	8.08	35.12	4.92	72.95
	(3.15)	(9.49)	(1.14)	(23.15)
Sauger	0.12	0.33	0.10	3.42
	(0.07)	(0.21)	(0.10)	(1.98)
Walleye	0.00	0.00	0.00	0.26
	(0.00)	(0.00)	(0.00)	(0.26)
Freshwater drum	1.38	0.36	5.60	1.82
	(0.41)	(0.23)	(2.53)	(0.53)

Strata: BWCS - Backwater, contiguous, shoreline
BWCO - Backwater, contiguous, offshore
IMPS - Impounded, shoreline
IMPO - Impounded, offshore
MCBU - Main channel border, unstructured
MCBW - Main channel border, wing dam
SCB - Side channel boarder
CTR - Main channel trough
TWZ - Tailwater

Table 4.3.4. Mean catch-per-unit-effort and (standard error) for fishes collected by using tandem fyke netting in Pool 26 of the Mississippi River using fixed-site sampling during 1991. See text for definitions of catch-per-unit-effort and standard error.

Common name	IMPO
Spotted gar	0.08 (0.08)
Longnose gar	0.10 (0.10)
Shortnose gar	4.70 (2.00)
Skipjack herring	0.17 (0.17)
Gizzard shad	1.48 (0.34)
Threadfin shad	1.01 (0.91)
Goldfish	0.10 (0.10)
Grass carp	0.10 (0.10)
Common carp	1.40 (0.52)
River carpsucker	1.95 (0.55)
Quillback	0.17 (0.17)
Smallmouth buffalo	0.92 (.62)
Shorthead redhorse	0.41 (0.32)
Black bullhead	0.84 (0.27)
Yellow bullhead	0.08 (0.08)
Brown bullhead	0.28 (0.12)
Channel catfish	0.10 (0.10)
White bass	13.00 (5.16)
Yellow bass	0.08 (0.08)
Warmouth	0.33 (0.21)
Orangespotted sunfish	0.17 (0.17)
Bluegill	84.90 (25.60)
Largemouth bass	0.19 (0.12)
White crappie	4.77 (2.59)
Black crappie	19.70 (7.34)
Sauger	0.08 (0.08)
Freshwater drum	0.28 (0.12)

Strata: BWCS - Backwater, contiguous, shoreline
BWCO - Backwater, contiguous, offshore
IMPS - Impounded, shoreline
IMPO - Impounded, offshore
MCBU - Main channel border, unstructured
MCBW - Main channel border, wing dam
SCB - Side channel boarder
CTR - Main channel trough
TWZ - Tailwater

Table 4.3.5. Mean catch-per-unit-effort and (standard error) for fishes collected by using mini fyke netting in Pool 26 of the Mississippi River using fixed-site sampling during 1991. See text for definitions of catch-per-unit-effort and standard error.

Common name	BWCS	IMPS	MCBW	TWZ
Spotted gar	0.04	0.00	0.00	0.00
	(0.04)	(0.00)	(0.00)	(0.00)
Longnose gar	0.22	0.00	0.26	0.00
	(0.13)	(0.00)	(0.17)	(0.00)
Shortnose gar	1.05	1.65	0.00	1.22
	(0.27)	(0.77)	(0.00)	(0.72)
Bowfin	0.04	0.00	0.00	0.00
	(0.04)	(0.00)	(0.00)	(0.00)
Skipjack herring	0.13	0.00	0.00	0.00
	(0.13)	(0.00)	(0.00)	(0.00)
Gizzard shad	2.24	0.71	3.14	0.00
	(0.89)	(0.45)	(2.42)	(0.00)
Threadfin shad	0.08	2.25	0.25	0.00
	(0.06)	(2.06)	(0.25)	(0.00)
Red shiner	7.05	0.16	3.17	3.91
	(4.02)	(0.16)	(2.75)	(2.48)
Spotfin shiner	0.00	0.00	0.00	0.27
	(0.00)	(0.00)	(0.00)	(0.27)
Common carp	0.53	0.00	0.77	2.03
	(0.26)	(0.00)	(0.26)	(0.84)
Silver chub	0.65	0.00	0.00	0.00
	(0.36)	(0.00)	(0.00)	(0.00)
Golden shiner	0.18	13.64	0.00	0.00
	(0.11)	(13.41)	(0.00)	(0.00)
Emerald shiner	3.74	0.16	0.80	9.51
	(1.38)	(0.16)	(0.56)	(7.03)
River shiner	5.28	10.61	5.22	0.80
	(3.13)	(10.61)	(3.30)	(0.80)
Ghost shiner	0.24	0.00	2.26	0.00
	(0.12)	(0.00)	(1.64)	(0.00)
Silverband shiner	0.00	0.00	0.40	0.00
	(0.00)	(0.00)	(0.40)	(0.00)
Sand shiner	0.00	0.00	0.13	0.00
	(0.00)	(0.00)	(0.13)	(0.00)
Mimic shiner	0.04	0.00	0.00	0.00
	(0.04)	(0.00)	(0.00)	(0.00)
Suckermouth minnow	0.04	0.38	0.00	0.00
	(0.04)	(0.38)	(0.00)	(0.0)
Bluntnose minnow	0.12	0.00	0.00	0.00
	(0.07)	(0.00)	(0.00)	(0.00)
Bullhead minnow	5.66	1.74	1.85	0.50
	(1.87)	(0.90)	(1.22)	(0.29)
River carpsucker	0.29	0.19	0.00	0.24
	(0.11)	(0.19)	(0.00)	(0.24)
Smallmouth buffalo	0.39	1.33	0.13	0.24
	(0.19)	(1.33)	(0.13)	(0.24)
Black bullhead	0.05	0.00	0.00	0.00
	(0.05)	(0.00)	(0.00)	(0.00)
Channel catfish	0.83	0.00	0.77	0.47
	(0.39)	(0.00)	(0.53)	(0.47)
Tadpole madtom	0.41	0.00	0.00	0.00
	(0.33)	(0.00)	(0.00)	(0.00)
Western mosquitofish	6.96	1.52	0.51	0.27
	(3.80)	(1.52)	(0.39)	(0.27)
Brook silverside	0.17	0.00	0.13	0.00
	(0.08)	(0.00)	(0.13)	(0.00)
White bass	0.58	2.08	1.77	8.81
	(0.18)	(2.08)	(1.10)	(4.13)
Yellow bass	0.09	0.00	0.00	0.24
	(0.06)	(0.00)	(0.00)	(0.24)

Strata: BWCS - Backwater, contiguous, shoreline
BWCO - Backwater, contiguous, offshore
IMPS - Impounded, shoreline
IMPO - Impounded, offshore
MCBU - Main channel border, unstructured
MCBW - Main channel border, wing dam
SCB - Side channel boarder
CTR - Main channel trough
TWZ - Tailwater

Table 4.3.5. Mean catch-per-unit-effort and (standard error) for fishes collected by using mini fyke netting in Pool 26 of the Mississippi River using fixed-site sampling during 1991. See text for definitions of catch-per-unit-effort and standard error.

Common nam	BWCS	IMPS	MCBW	TWZ
Green sunfish	0.65	1.47	0.00	0.00
	(0.36)	(1.09)	(0.00)	(0.00)
Warmouth	0.34	0.69	0.00	0.00
	(0.19)	(0.37)	(0.00)	(0.00)
Orangespotted sunfish	1.65	21.00	0.26	0.00
	(0.60)	(19.68)	(0.17)	(0.00)
Bluegill	158.14	41.27	6.06	1.72
	(53.85)	(22.59)	(2.23)	(0.45)
Largemouth bass	0.13	0.00	0.13	0.00
	(0.07)	(0.00)	(0.13)	(0.00)
White crappie	2.29	0.00	0.80	2.12
	(1.07)	(0.00)	(0.52)	(1.82)
Black crappie	2.20	2.16	0.39	2.12
	(0.75)	(1.00)	(0.19)	(2.12)
Mud darter	0.04	0.00	0.00	0.00
	(0.04)	(0.00)	(0.00)	(0.00)
Logperch	0.05	0.00	0.00	0.00
	(0.05)	(0.00)	(0.00)	(0.00)
Sauger	0.00	0.00	0.12	0.00
	(0.00)	(0.00)	(0.12)	(0.00)
Freshwater drum	0.74	0.16	0.51	0.26
	(0.40)	(0.16)	(0.27)	(0.26)

Strata: BWCS - Backwater, contiguous, shoreline
BWCO - Backwater, contiguous, offshore
IMPS - Impounded, shoreline
IMPO - Impounded, offshore
MCBU - Main channel border, unstructured
MCBW - Main channel border, wing dam
SCB - Side channel boarder
CTR - Main channel trough
TWZ - Tailwater

Table 4.3.6. Mean catch-per-unit-effort and (standard error) for fishes collected by using tandem mini fyke netting in Pool 26 of the Mississippi River using fixed-site sampling dring 1991. See text for definitions of catch-per-unit-effort and standard error.

Common name	IMPO
Longnose gar	0.38
	(0.28)
Gizzard shad	493.34
	(487.07)
Threadfin shad	0.94
	(0.54)
Golden shiner	0.09
	(0.09)
Bullhead minnow	25.64
	(15.63)
Black bullhead	0.18
	(0.11)
Western mosquitofish	0.10
	(0.10)
Brook silverside	0.09
	(0.09)
White bass	0.35
	(0.11)
Green sunfish	0.35
	(0.25)
Warmouth	0.46
	(0.22)
Orangespotted sunfish	5.52
	(2.76)
Bluegill	10.51
	(2.60)
White crappie	0.17
	(0.17)
Black crappie	0.09
	(0.09)
Walleye	0.10
	(0.10)
Freshwater drum	0.27
	(0.12)

Strata: BWCS - Backwater, contiguous, shoreline
BWCO - Backwater, contiguous, offshore
IMPS - Impounded, shoreline
IMPO - Impounded, offshore
MCBU - Main channel border, unstructured
MCBW - Main channel border, wing dam
SCB - Side channel boarder
CTR - Main channel trough
TWZ - Tailwater

Table 4.3.7. Mean catch-per-unit-effort and (standard error) for fishes collected by using tandem hoop netting in Pool 26 of the Mississippi River using fixed-site sampling during 1991. See text for definitions of catch-per-unit-effort and standard error.

Common name	MCBU	MCBW	SCB	TWZ
Shortnose gar	0.08	0.00	0.04	0.00
	(0.08)	(0.00)	(0.04)	(0.00)
Mooneye	0.04	0.00	0.00	0.00
	(0.04)	(0.00)	(0.00)	(0.00)
Skipjack herring	0.00	0.07	0.00	0.00
	(0.00)	(0.07)	(0.00)	(0.00)
Gizzard shad	0.00	0.32	0.00	0.32
	(0.00)	(0.32)	(0.00)	(0.20)
Common carp	0.17	0.85	1.23	0.66
	(0.10)	(0.46)	(0.56)	(0.30)
River carpsucker	0.08	0.32	1.06	1.29
	(0.08)	(0.19)	(0.85)	(1.19)
Quillback	0.04	0.00	0.04	0.16
	(0.04)	(0.00)	(0.04)	(0.16)
Smallmouth buffalo	3.53	2.52	3.97	14.99
	(1.28)	(1.67)	(1.91)	(13.30)
Bigmouth buffalo	0.00	0.00	0.08	0.00
	(0.00)	(0.00)	(0.06)	(0.00)
Shorthead redhorse	0.04	0.00	0.00	0.00
	(0.04)	(0.00)	(0.00)	(0.00)
Black bullhead	0.00	0.00	0.00	0.08
	(0.00)	(0.00)	(0.00)	(0.08)
Blue catfish	0.00	0.00	0.00	0.09
	(0.00)	(0.00)	(0.00)	(0.09)
Channel catfish	1.27	0.60	6.60	2.44
	(0.65)	(0.40)	(3.66)	(1.57)
Flathead catfish	0.33	0.06	0.17	0.26
	(0.20)	(0.06)	(0.10)	(0.12)
White bass	0.00	0.45	0.00	0.00
	(0.00)	(0.33)	(0.00)	(0.00)
Bluegill	0.00	0.13	0.00	0.00
	(0.00)	(0.09)	(0.00)	(0.00)
Freshwater drum	0.72	3.25	0.53	0.61
	(0.24)	(1.44)	(0.28)	(0.35)

Strata: BWCS - Backwater, contiguous, shoreline
BWCO - Backwater, contiguous, offshore
IMPS - Impounded, shoreline
IMPO - Impounded, offshore
MCBU - Main chanel border, unstructured
MCBW - Main channel border, wing dam
SCB - Side channel boarder
CTR - Main channel trough
TWZ - Tailwater

Table 4.3.8. Mean catch-per-unit-effort and (standard error) for fishes collected by using seining in Pool 26 of the Mississippi River using fixed-site sampling during 1991. See text for definitions of catch-per-unit-effort and standard error.

Common name	MCBU
Gizzard shad	13.40
	(6.02)
Red shiner	0.20
	(0.20)
Common carp	0.10
	(0.10)
Emerald shiner	3.90
	(1.35)
River shiner	1.20
	(0.53)
Mimic shiner	0.10
	(0.10)
River carpsucker	0.10
	(0.10)
Channel catfish	3.00
	(1.11)
Brook silverside	0.60
	(0.34)
White bass	0.70
	(0.42)
Freshwater drum	0.10
	(0.10)

Strata: BWCS - Backwater, contiguous, shoreline
BWCO - Backwater, contiguous, offshore
IMPS - Impounded, shoreline
IMPO - Impounded, offshore
MCBU - Main channel border, unstructured
MCBW - Main channel border, wing dam
SCB - Side channel boarder
CTR - Main channel trough
TWZ - Tailwater

Table 4.3.9. Mean catch-per-unit-effort and (standard error) for fishes collected by using bottom trawling in Pool 26 of the Mississippi River using fixed-site sampling during 1991. See text for definitions of catch-per-unit-effort and standard error.

Common name	MCBU	TWZ
Lake sturgeon	0.00	0.08
	(0.00)	(0.08)
Shovelnose sturgeon	0.08	1.25
	(0.06)	(0.82)
Gizzard shad	0.04	0.00
	(0.04)	(0.00)
Common carp	0.00	0.00
	(0.00)	(0.00)
Speckled chub	0.21	0.00
	(0.21)	(0.00)
River shiner	0.13	0.00
	(0.09)	(0.00)
River carpsucker	0.00	0.17
	(0.00)	(0.17)
Shorthead redhorse	0.04	0.00
	(0.04)	(0.00)
Blue catfish	0.00	0.08
	(0.00)	(0.08)
Channel catfish	1.71	4.50
	(0.47)	(1.80)
Flathead catfish	0.08	0.00
	(0.06)	(0.00)
Freshwater drum	0.13	5.67
	(0.07)	(2.43)

Strata: BWCS - Backwater, contiguous, shoreline
BWCO - Backwater, contiguous, offshore
IMPS - Impounded, shoreline
IMPO - Impounded, offshore
MCBU - Main channel border, unstructured
MCBW - Main channel border, wing dam
SCB - Side channel boarder
CTR - Main channel trough
TWZ - Tailwater

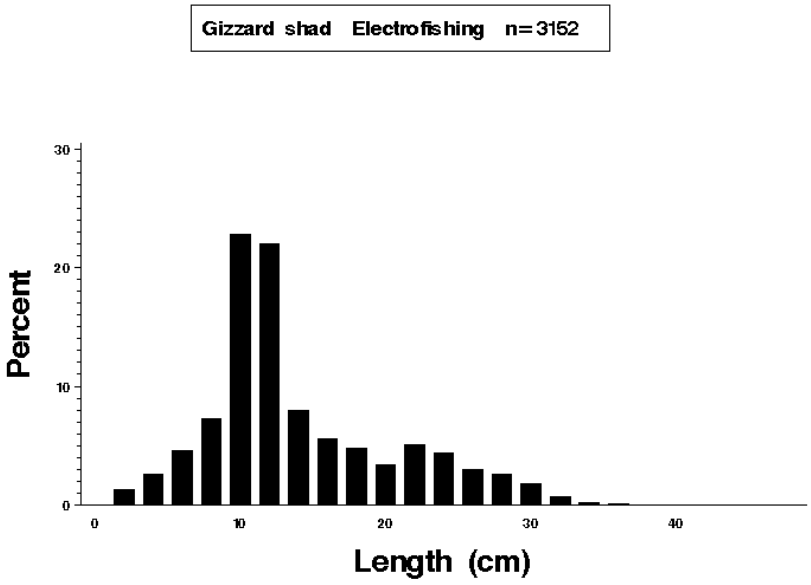

Figure 4.2. Length distributions (*length*) as a percentage of catch (*percent*) for gizzard shad (*Dorosoma cepedianum*) collected by electrofishing in Upper Mississippi River Pool 26 during 1991.

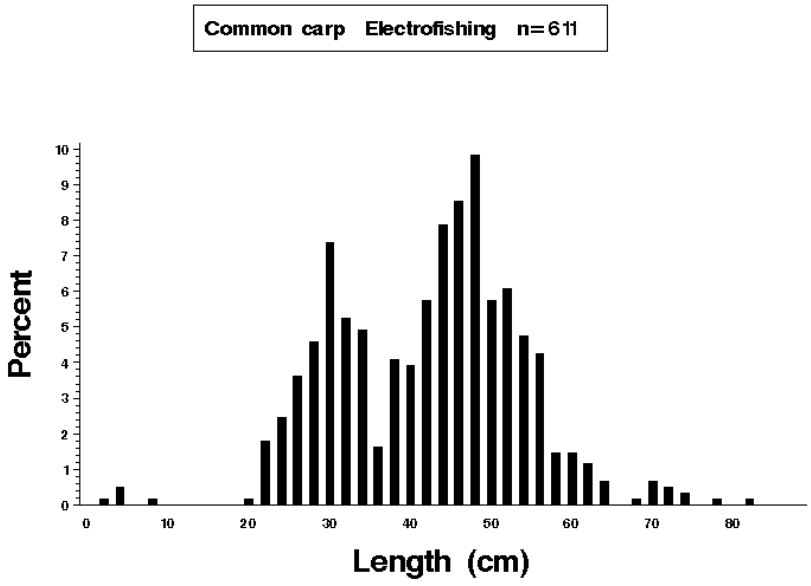

Figure 4.3. Length distributions (*length*) as a percentage of catch (*percent*) for common carp (*Cyprinus carpio*) collected by electrofishing in Upper Mississippi River Pool 26 during 1991.

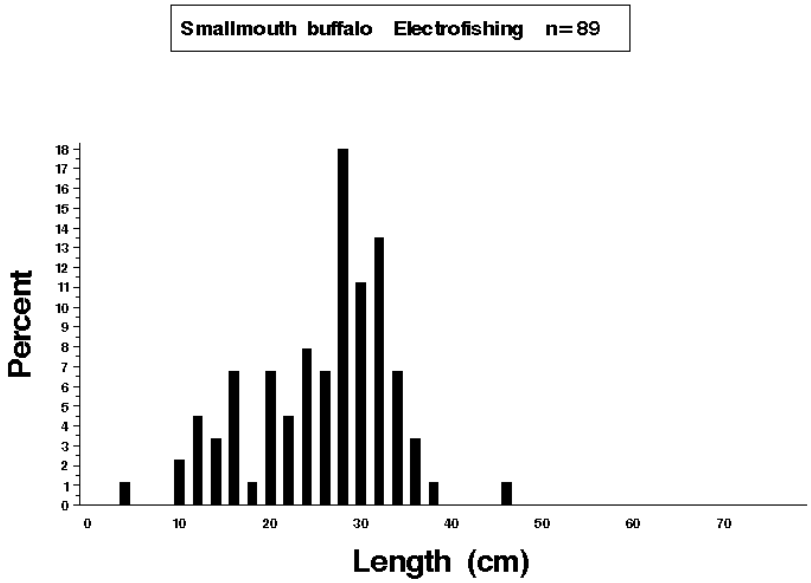

Figure 4.4. Length distributions (*length*) as a percentage of catch (*percent*) for smallmouth buffalo (*Ictiobus bubalus*) collected by electrofishing in Upper Mississippi River Pool 26 during 1991.

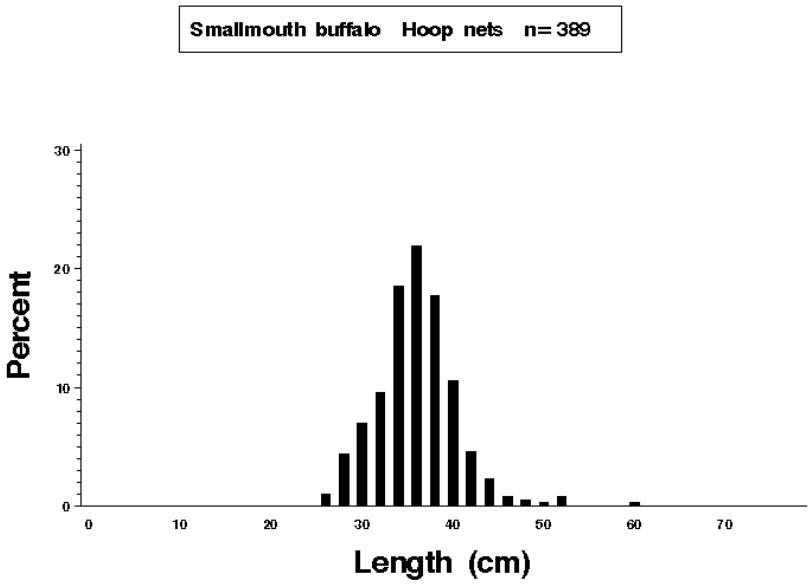

Figure 4.5. Length distributions (*length*) as a percentage of catch (*percent*) for smallmouth buffalo (*Ictiobus bubalus*) collected by large and small hoop netting in Upper Mississippi River Pool 26 during 1991.

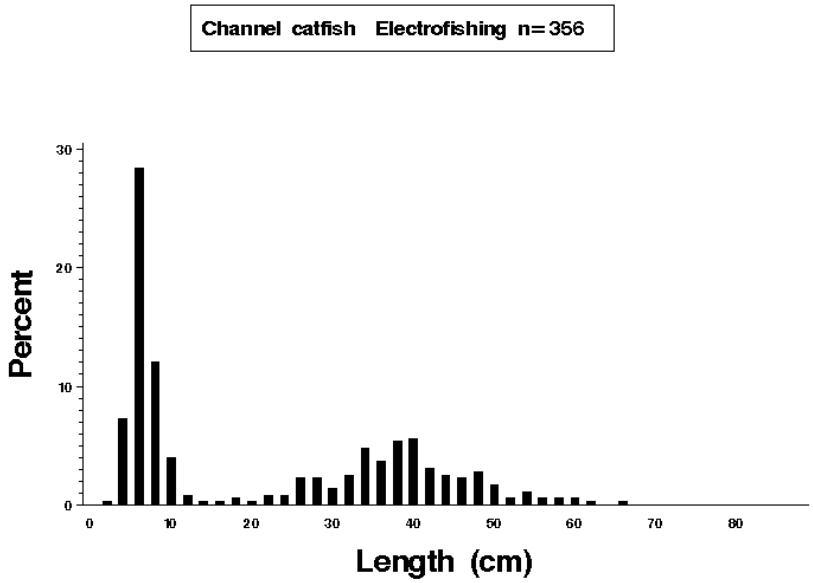

Figure 4.6. Length distributions (*length*) as a percentage of catch (*percent*) for channel catfish (*Ictalurus punctatus*) collected by electrofishing in Upper Mississippi River Pool 26 during 1991.

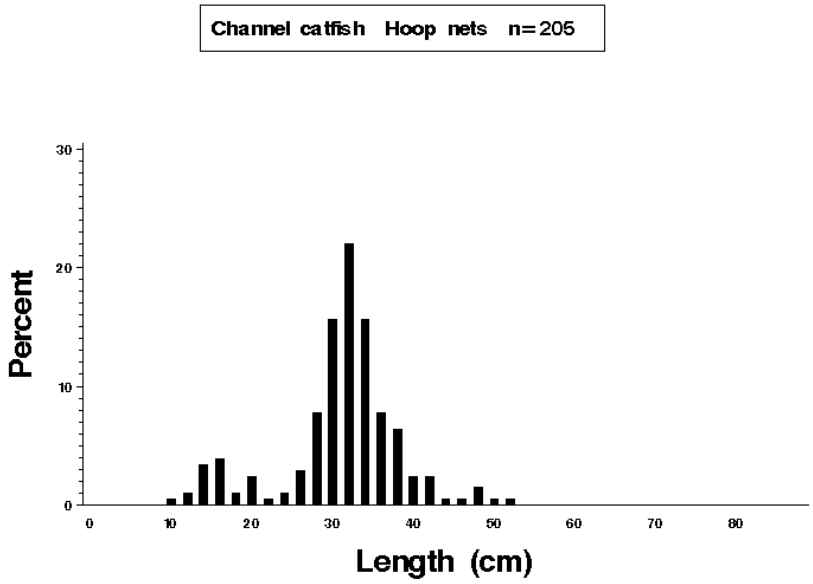

Figure 4.7. Length distributions (*length*) as a percentage of catch (*percent*) for channel catfish (*Ictalurus punctatus*) collected by large and small hoop netting in Upper Mississippi River Pool 26 during 1991.

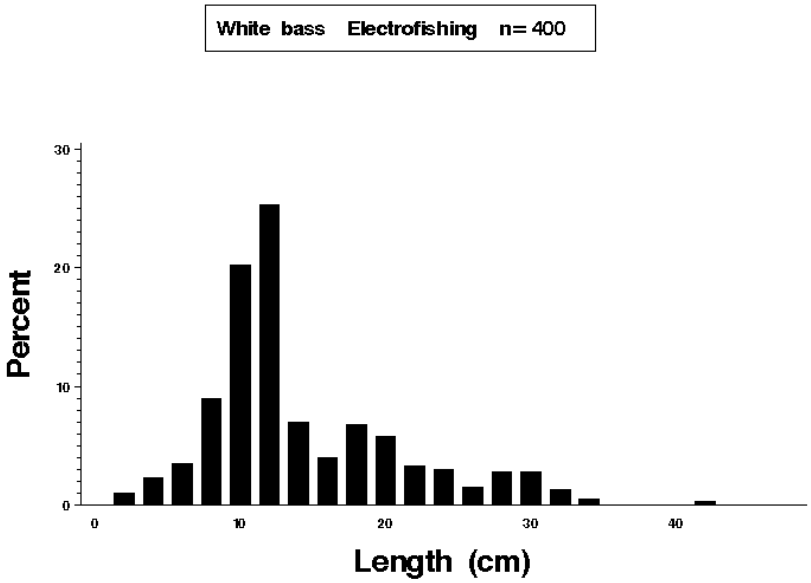

Figure 4.8. Length distributions (*length*) as a percentage of catch (*percent*) for white bass (*Morone chryops*) collected by electrofishing in Upper Mississippi River Pool 26 during 1991.

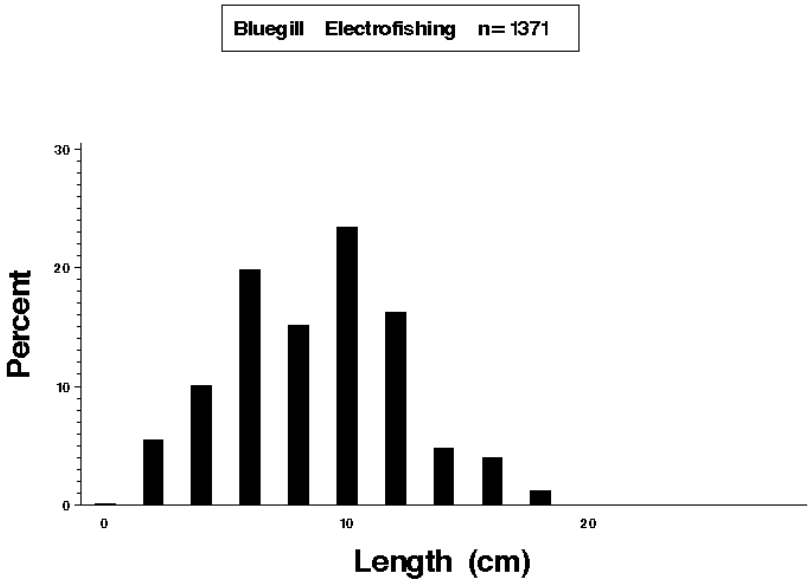

Figure 4.9. Length distributions (*length*) as a percentage of catch (*percent*) for bluegill (*Lepomis macrochirus*) collected by electrofishing in Upper Mississippi River Pool 26 during 1991.

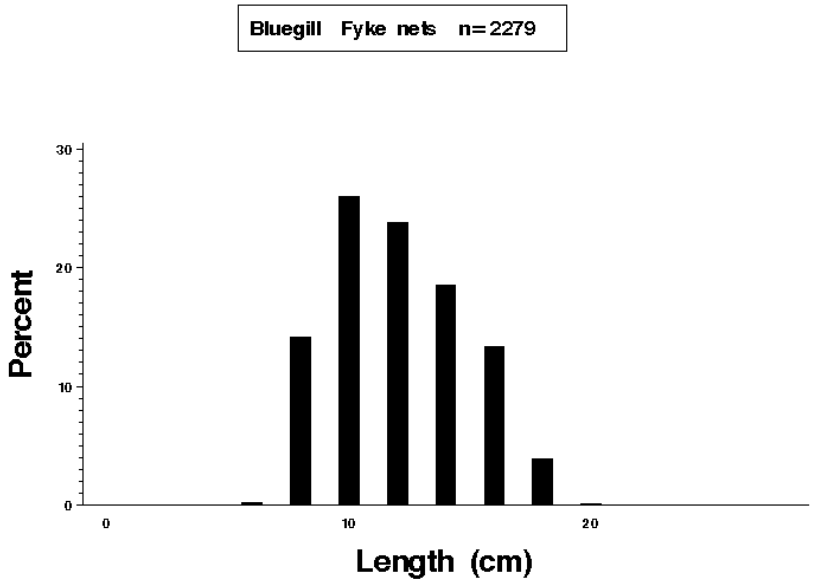

Figure 4.10. Length distributions (*length*) as a percentage of catch (*percent*) for bluegill (*Lepomis macrochirus*) collected by fyke netting in Upper Mississippi River Pool 26 during 1991.

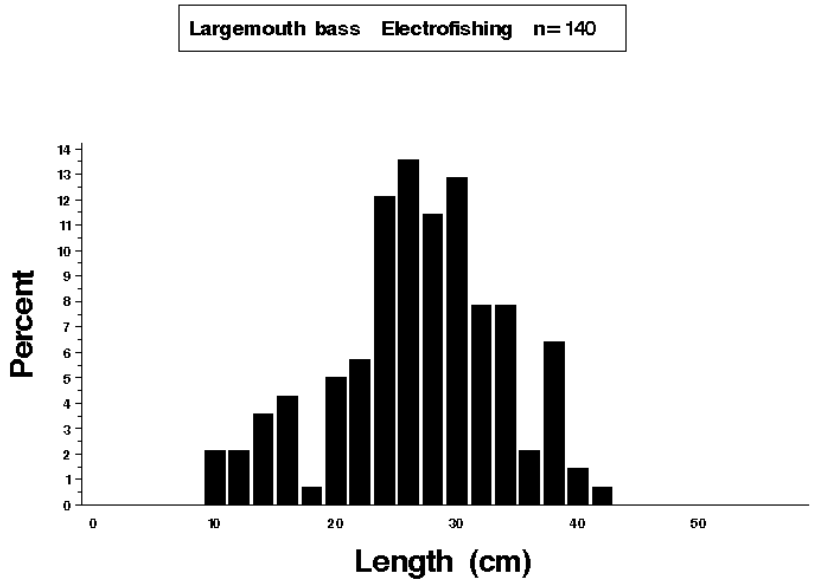

Figure 4.11. Length distributions (*length*) as a percentage of catch (*percent*) for largemouth bass (*Micropterus salmoides*) collected by electrofishing in Upper Mississippi River Pool 26 during 1991.

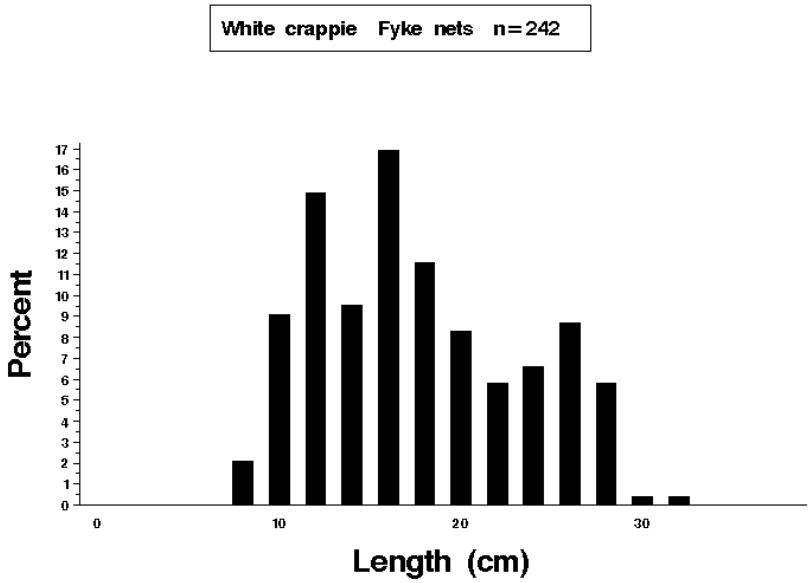

Figure 4.12. Length distributions (*length*) as a percentage of catch (*percent*) for white crappie (*Pomoxis annularus)* collected by fyke netting in Upper Mississippi River Pool 26 during 1991.

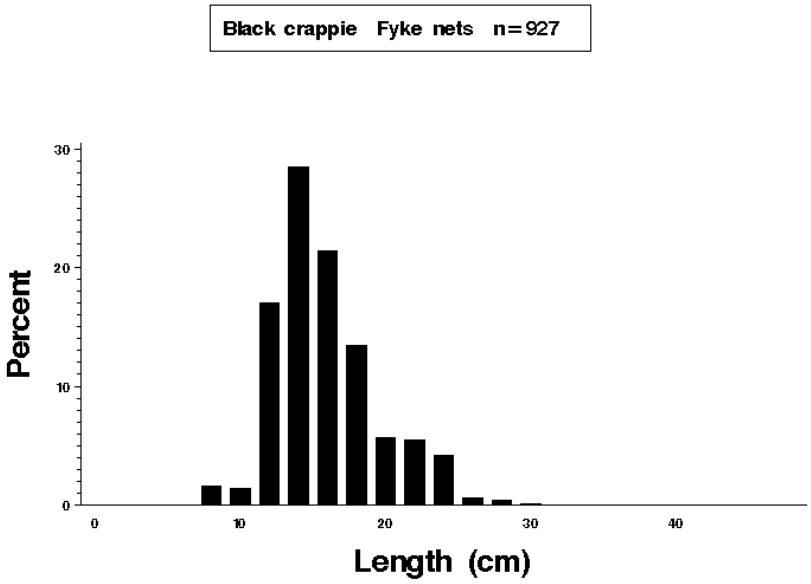

Figure 4.13. Length distributions (*length*) as a percentage of catch (*percent*) for black cr*appie (Pomoxis nigromacul*atus) collected by electrofishing in Upper Mississippi River Pool 26 during 1991.

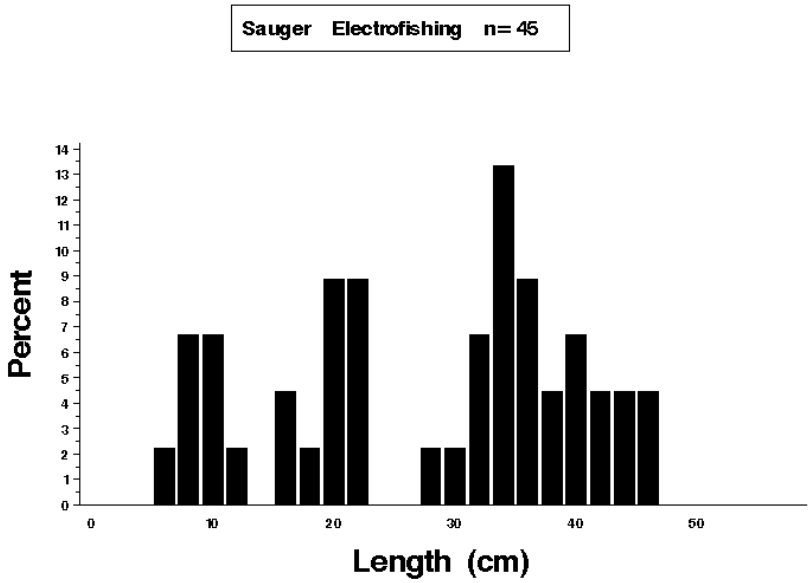

Figure 4.14. Length distributions (*length*) as a percentage of catch (*percent*) for sauger (*Stizostedion canade*nse) collected by electrofishing in Upper Mississippi River Pool 26 during 1991.

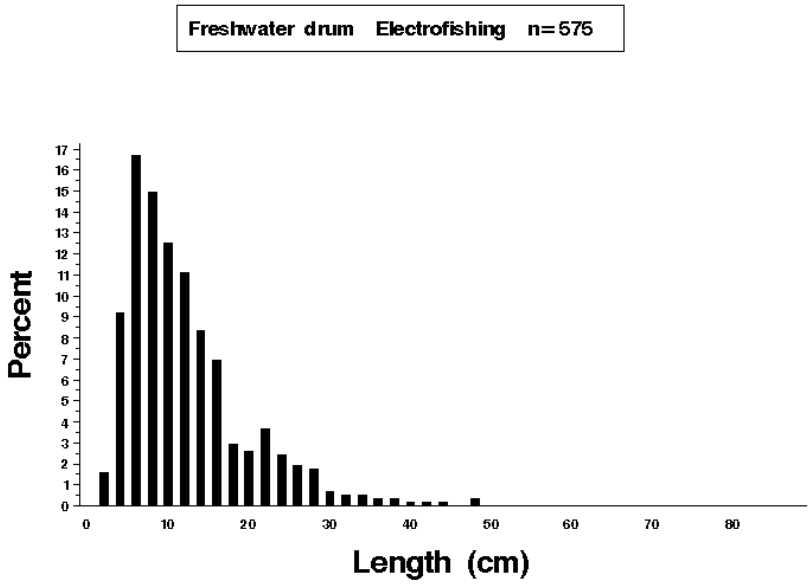

Figure 4.15. Length distributions (*length*) as a percentage of catch (*percent*) for freshwater drum (*Aplodinotus grunniens*) collected by electrofishing in Upper Mississippi River Pool 26 during 1991.

Chapter 5. Mississippi River Open Reach

by

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Hydrograph

Open Mississippi River water stages are influenced by discharges from the Upper Mississippi, Missouri, Illinois, and to a lesser extent, Ohio Rivers. Water stage may fluctuate in the open river by 3–5 feet/week and more than 20 feet/year. At stages above 22.0 feet (Cape Girardeau Gage, 326 feet above mean sea level), successful gear sets are reduced by high water velocity and flooded riparian vegetation. At stages between 22.0 and 17.0 feet, wing dams become partly to totally submerged. Water velocity above submerged wing dams limits the use of most sampling gear. At stages below 17.0 feet, closing structures emerge making it difficult to access side channels. Gear must be carried in or private landowner permission must be granted to access isolated waters. The SCB is the most difficult stratum to sample, primarily because of access problems.

In 1991, water stages were higher than normal in winter and spring, and lower than normal in summer and fall. Fluctuations in water stage were typically 5–8 feet during 2-week periods. The lowest stage occurred on September 9 (7.0 feet) and the highest stage occurred on May 3 (31.8 feet). Water stages during Long Term Resource Monitoring Program sampling in 1991 could be characterized as low and unstable (Figure 5.1).

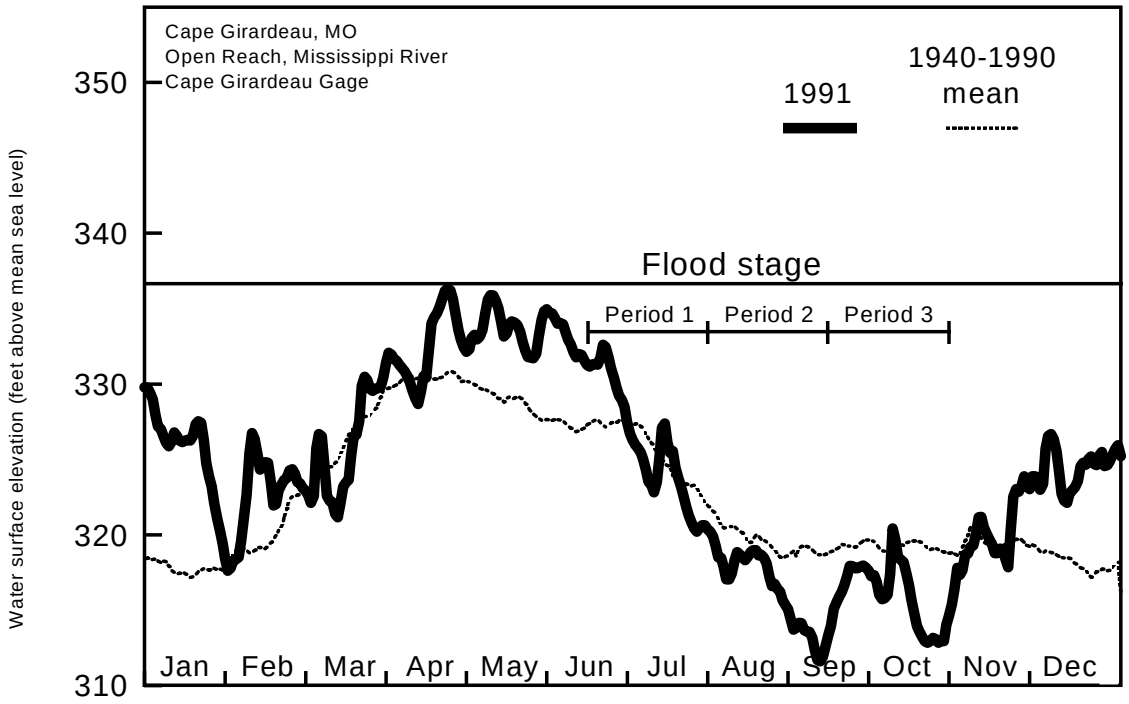

Figure 5.1. Daily water surface elevation from Cape Girardeau Gage for the Upper Mississippi River Open Reach, during 1991 and mean elevation since 1940. The U.S. Army Corps of Engineers discharge data were obtained from the Environmental Management Technical Center (Wlosinski et al. 1995).

Summary of Sampling Effort

In 1991, 34 fixed sites were subjectively chosen by Open River Field Station staff to best represent four habitat strata: SCB (15 sites), MCBU (10 sites), CTR (3 sites), and MCBW (6 sites). Four hundred eighty-three fixed-site samples were planned, consisting of 161 samples in each of three periods. We completed 434 samples (90% of what we planned to do) in 1991 consisting of 123, 149, and 162 samples in periods 1, 2, and 3, respectively (Table 5.1).

Total Catch by Gear

Historically, 129 fish species have been collected from the open river (Pitlo et al. 1995). In 1991, we collected 65 species and two hybrids representing 18,088 fish (Table 5.2). This total does not include four fish identified only to family or genus. The five most abundant species were the gizzard shad (3,942), red shiner (1,945), channel shiner (1,680), channel catfish (1,461), and freshwater drum (1,409).

The following summarizes total fish catch and number of species by gear: day electrofishing, 3,975 fish and 44 species; night electrofishing, 1,545 fish and 37 species; fyke netting, 973 fish and 23 species; mini fyke netting, 2,838 fish and 36 species; seining, 6,829 fish and 29 species; tandem hoop netting, 483 fish and 15 species; and trawling, 1,445 fish and 20 species.

Four Missouri-listed species were collected: paddlefish, mooneye, sicklefin chub, and blue sucker. These species are also candidates for Federal listing.

Fixed Sampling, Mean *C/f* by Gear and Stratum

Day Electrofishing

Gizzard shad (46.98 fish/15 min), channel catfish (3.20), and river carpsucker (3.09) had the highest day electrofishing *C/f*s in the MCBU stratum (Table 5.3.1). Gizzard shad (26.73), white bass (3.26), and threadfin shad (3.12) had the highest *C/f*s in the MCBW stratum. Gizzard shad (46.12), bluegill (14.68), and red shiner (11.88) had the highest *C/f*s in the SCB stratum.

Night Electrofishing

Freshwater drum (14.77 fish/15 min), gizzard shad (7.75), and channel catfish (3.34) had the highest night electrofishing *C/f*s in the MCBU stratum (Table 5.3.2). Gizzard shad (41.44), freshwater drum (22.00), and channel catfish (5.97) had the highest *C/f*s in the SCB stratum.

Fyke Net

Freshwater drum (3.78 fish/net-day), white bass (3.18), and shortnose gar (1.32) had the highest fyke netting *C/f*s in the MCBW stratum (Table 5.3.3). Shortnose gar (5.74), white crappie (5.30), and river carpsucker (3.19) had the highest *C/f*s in the SCB stratum.

Mini Fyke Net

Freshwater drum (5.77 fish/net-day), channel catfish (1.85), and white crappie (1.74) had the highest mini fyke netting *C/f*s in the MCBW stratum (Table 5.3.4). Red shiner (21.83), bluegill (21.53), and channel shiner (15.13) had the highest *C/f*s in the SCB stratum.

Tandem Hoop Nets

Channel catfish had the highest tandem hoop netting *C/f*s in the MCBU (5.33 fish/net-day) and SCB (15.31) strata (Table 5.3.5). Freshwater drum (0.45) had the highest *C/f* in the MCBW stratum.

Seining

River shiner (4.84 fish/haul), emerald shiner (4.34), and channel catfish (2.17) had the highest seining *C/f*s in the MCBU stratum (Table 5.3.6). Channel shiner (20.84), red shiner (18.41), and gizzard shad (16.11) had the highest *C/f*s in the SCB stratum.

Trawling

Channel catfish had the highest *C/f* in the MCBU (8.53 fish/haul) and SCB (13.13 fish/haul) strata (Table 5.3.7). Blue catfish (1.27 fish/haul), channel catfish (0.82), and freshwater drum (0.73) had the highest *C/f*s in the CTR stratum. Most fish collected by trawling were young of the year.

Length Distributions of Selected Species

Length–frequency histograms are presented for selected species in Figures 5.2 to 5.14. Meaningful biological interpretation of the histograms is limited because of small sample size or size selectivity of the gear (Anderson and Neumann 1996). Despite these biases, some river managers may find the histograms useful, therefore we have included them in this report. No age–growth data are available at this time for the open Mississippi River study reach.

Gizzard Shad

Two thousand seven hundred eighty-two gizzard shad were collected by day and night electrofishing (Figure 5.2). Gizzard shad, ranging from 6 to 18 cm in length, composed nearly 40% of the electrofishing sample.

Common Carp

One hundred fifty-nine common carp were collected by day and night electrofishing (Figure 5.3). Modal length was 52 cm, with the greatest number of common carp between 44 and 54 cm.

Smallmouth Buffalo

Twenty-three smallmouth buffalo were collected by day and night electrofishing (Figure 5.4). The length–frequency distribution comprised 4–63-cm-long fish, with a mode at 34 cm.

Channel Catfish

Two hundred forty-three channel catfish were collected by day and night electrofishing (Figure 5.5). The length–frequency distribution comprised 1–69-cm-long fish, with modes at 6 and 36 cm.

Three hundred fifty-five channel catfish were collected in tandem hoop nets (Figure 5.6). The length–frequency distribution comprised 14–71-cm-long fish, with modes at 22 and 32 cm.

White Bass

One hundred thirty white bass were collected by day and night electrofishing (Figure 5.7). The length–frequency distribution comprised 4–40-cm-long fish, with modes at 14 and 26 cm.

Bluegill

Two hundred eighty-four bluegill were collected by day and night electrofishing (Figure 5.8). The length–frequency distribution comprised 2–20-cm-long fish, with modes at 2 and 16 cm.

Eighty-two bluegill were collected by fyke netting (Figure 5.9). The length–frequency distribution comprised 4–18-cm-long fish, with modes at 8 and 16 cm.

Largemouth Bass

Fourteen largemouth bass were collected by day and night electrofishing (Figure 5.10). The length–frequency distribution comprised 8–37-cm-long fish.

White Crappie

One hundred ninety-one white crappie were collected by fyke netting (Figure 5.11). The bimodal length–frequency distribution comprised 6–32-cm-long fish, with modes at 10 and 26 cm.

Sauger

Fifteen sauger were collected by day electrofishing (Figure 5.12). The length–frequency distribution comprised 12–43-cm-long fish.

Freshwater Drum

Six hundred twenty-nine freshwater drum were collected by day and night electrofishing (Figure 5.13). The length–frequency distribution comprised 1–46-cm-long fish, with a mode at 10 cm.

Eighty-four freshwater drum were collected by fyke netting (Figure 5.14). The length–frequency distribution comprised 8–39-cm-long fish, with modes at 12 and 28 cm.

Table 5.1. Allocation of fish sampling effort among strata by the Long Term Resource Monitoring Program in the open Mississippi River during 1991. Table entries are numbers of successfully completed standardized monitoring collections.

Sampling period = 1: June 15 - July 31

Sampling gear	BWCS	BWCO	SCB	MCB	MCBW	IMPS	IMPO	CTR	TWZ	TOTAL
Day electrofishing			8	9	6					23
Fyke net			10		3					13
Tandem hoop net			1	5	2					8
Mini fyke net			7		4					11
Night electrofishing			6	6						12
Seine			12	12						24
Trawling			3	19				10		32
SUBTOTAL	0	0	47	51	15	0	0	10	0	123

Sampling period = 2: August 1 - September 14

Sampling gear	BWCS	BWCO	SCB	MCBU	MCBW	IMPS	IMPO	CTR	TWZ	TOTAL
Day electrofishing			3	9	5					17
Fyke net			13		6					19
Tandem hoop net			1	8	3					12
Mini fyke net			12		6					18
Night electrofishing			2	5						7
Seine			20	24						44
Trawling			3	18				11		32
SUBTOTAL	0	0	54	64	20	0	0	11	0	149

Sampling period = 3: September 15 - October 31

Sampling gear	BWCS	BWO	SCB	MCBU	MCBW	IMPS	IMPO	CTR	TWZ	TOTAL
Day electrofishing			5	9	6					20
Fyke net			11	1	5					17
Tandem hoop net			2	9	3					14
Mini fyke net			11		6					17
Night electrofishing			3	5						8
Seine			24	28						52
Trawling			2	20				12		34
SUBTOTAL	0	0	58	72	20	0	0	12	0	162
	0	0	159	187	55	0	0	33	0	434

Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.
BWCO - Backwater, contiguous, offshore. SCB - Side channel border.
IMPS - Impounded, shoreline. CTR - Main channel trough.
IMPO - Impounded, offshore. TWZ - Tailwater.
MCBU - Main channel border, unstructured.

Table 5.2. Total catches, by gear type, of fishes collected by the Long Term Resource Program during 1991 in the open Mississippi River. See Table 5.1 for the list of sampling gears actually deployed in this study reach.

Species	Common name	Scientific name	D	N	F	X	M	Y	S	H	T	TOTAL
1	Chestnut lamprey	Ichthyomyzon castaneus	-	3	-	-	-	-	-	-	-	3
2	Shovelnose sturgeon	Scaphirhynchus platorynchus	2	-	-	-	-	-	1	-	36	39
3	Paddlefish	Polyodon spathula	-	2	-	-	-	-	-	-	-	2
4	Spotted gar	Lepisosteus oculatus	1	-	-	-	-	-	-	-	-	1
5	Longnose gar	Lepisosteus osseus	1	6	1	-	-	-	-	-	-	8
6	Shortnose gar	Lepisosteus platostomus	82	58	224	-	11	-	18	3	-	396
7	Bowfin	Amia calva	-	-	1	-	-	-	-	-	-	1
8	Goldeye	Hiodon alosoides	70	17	2	-	-	-	35	-	3	127
9	Mooneye	Hiodon tergisus	1	-	-	-	-	-	1	-	-	2
10	American eel	Anguilla rostrata	12	2	-	-	-	-	-	1	-	15
11	Skipjack herring	Alosa chrysochloris	43	-	-	-	-	-	2	-	2	47
12	Gizzard shad	Dorosoma cepedianum	2211	571	51	-	130	-	974	3	2	3942
13	Threadfin shad	Dorosoma petenense	92	17	12	-	9	-	284	-	-	414
14	Central stoneroller	Campostoma anomalum	-	-	-	-	-	-	2	-	-	2
15	Red shiner	Cyprinella lutrensis	213	32	-	-	628	-	1071	-	1	1945
16	Blacktail shiner	Cyprinella venusta	-	1	-	-	3	-	-	-	-	4
17	Common carp	Cyprinus carpio	125	34	14	-	1	-	-	3	2	179
18	Plains minnow	Hybognathus placitus	-	-	-	-	1	-	-	-	-	1
19	Speckled chub	Macrhybopsis aestivalis	3	2	-	-	2	-	74	-	17	98
20	Sicklefin chub	Macrhybopsis meeki	-	-	-	-	-	-	-	-	2	2
21	Silver chub	Macrhybopsis storeriana	4	1	-	-	3	-	6	-	2	16
22	Golden shiner	Notemigonus crysoleucas	-	-	-	-	1	-	-	-	-	1
23	Emerald shiner	Notropis atherinoides	66	34	-	-	45	-	852	-	-	997
24	River shiner	Notropis blennius	25	10	-	-	27	-	628	-	-	690
25	Bigeye shiner	Notropis boops	-	-	-	-	-	-	2	-	-	2
26	Ghost shiner	Notropis buchanani	-	-	-	-	2	-	-	-	-	2
27	Ozark minnow	Notropis nubilus	-	-	-	-	1	-	-	-	-	1
28	Silverband shiner	Notropis shumardi	13	15	-	-	401	-	593	-	17	1039
29	Sand shiner	Notropis stramineus	-	-	-	-	-	-	5	-	-	5
30	Channel shiner	Notropis wickliffi	10	6	-	-	459	-	1204	-	1	1680
31	Unidentified shiner	Notropis sp.	-	-	-	-	-	-	1	-	-	1
32	Bluntnose minnow	Pimephales notatus	1	1	-	-	2	-	-	-	-	4
33	Bullhead minnow	Pimephales vigilax	7	1	-	-	31	-	7	-	-	46
34	Unidentified minnow	Unidentified Cyprinidae	-	-	-	-	-	-	-	-	2	2
35	River carpsucker	Carpiodes carpio	129	45	119	-	9	-	550	15	19	886
36	Quillback	Carpiodes cyprinus	2	3	-	-	-	-	-	-	-	5
37	Blue sucker	Cycleptus elongatus	-	-	-	-	-	-	-	1	-	1
38	Smallmouth buffalo	Ictiobus bubalus	17	6	12	-	1	-	5	5	2	48
39	Bigmouth buffalo	Ictiobus cyprinellus	6	-	1	-	-	-	-	-	-	7
40	Shorthead redhorse	Moxostoma macrolepidotum	-	-	-	-	-	-	-	1	-	1

Gears: D - Day electrofishing
N - Night electrofishing
F - Fyke netting
M - Mini fyke netting
T - Trawling (4.8-m bottom trawl)
S - Seining
H - Small and large hoop netting
X - Tandem fyke netting
Y - Tandem mini fyke netting

Table 5.2. Total catches, by gear type, of fishes collected by the Long Term Resource Program during 1991 in the open Mississippi River. See Table 5.1 for the list of sampling gears actually deployed in this study reach.

Species	Common name	Scientific name	D	N	F	X	M	Y	S	H	T	TOTAL
41	Blue catfish	Ictalurus furcatus	22	1	3	-	-	-	2	4	339	371
42	Channel catfish	Ictalurus punctatus	133	110	12	-	55	-	178	355	618	1461
43	Freckled madtom	Noturus nocturnus	10	6	-	-	6	-	1	2	2	27
44	Flathead catfish	Pylodictis olivaris	55	18	13	-	4	-	-	20	2	112
45	Northern studfish	Fundulus catenatus	1	-	-	-	-	-	-	-	-	1
46	Blackstripe topminnow	Fundulus notatus	-	-	-	-	1	-	-	-	-	1
47	Western mosquitofish	Gambusia affinis	-	-	-	-	74	-	121	-	-	195
48	Brook silverside	Labidesthes sicculus	4	2	-	-	1	-	5	-	-	12
49	White bass	Morone chrysops	96	34	135	-	12	-	23	5	3	308
50	Yellow bass	Morone mississippiensis	1	1	4	-	-	-	-	-	-	6
51	Striped bass	Morone saxatilis	4	-	1	-	-	-	-	-	-	5
52	Green sunfish	Lepomis cyanellus	14	1	-	-	2	-	-	-	-	17
53	Warmouth	Lepomis gulosus	-	-	-	-	1	-	-	-	-	1
54	Orangespotted sunfish	Lepomis humilis	11	4	-	-	11	-	-	-	1	27
55	Bluegill	Lepomis macrochirus	260	24	82	-	655	-	77	-	-	1098
56	Longear sunfish	Lepomis megalotis	2	1	-	-	-	-	-	-	-	3
57	Orangespotted x longear sunfish	L. humilis x L. megalotis	-	-	-	-	1	-	-	-	-	1
58	Bluegill x longear sunfish	L. macrochirus x L. megalotis	-	-	1	-	-	-	-	-	-	1
59	Spotted bass	Micropterus punctulatus	9	-	-	-	-	-	-	-	-	9
60	Largemouth bass	Micropterus salmoides	11	3	1	-	1	-	-	-	-	16
61	White crappie	Pomoxis annularis	26	7	191	-	90	-	4	-	-	318
62	Black crappie	Pomoxis nigromaculatus	-	-	2	-	-	-	-	-	-	2
63	Unidentified sunfish	Unidentified Centrarchidae	-	1	-	-	-	-	-	-	-	1
64	Johnny darter	Etheostoma nigrum	-	-	-	-	1	-	-	-	-	1
65	Logperch	Percina caprodes	1	-	-	-	-	-	-	-	-	1
66	Slenderhead darter	Percina phoxocephala	1	-	-	-	-	-	-	-	-	1
67	Sauger	Stizostedion canadense	8	7	7	-	-	-	-	3	-	25
68	Freshwater drum	Aplodinotus grunniens	170	459	84	-	156	-	104	62	374	1409
			3975	1546	973	0	2838	0	6830	483	1447	18092

Gears: D - Day electrofishing
N - Night electrofishing
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S - Seining
H - Small and large hoop netting
X - Tandem fyke netting
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Table 5.3.1. Mean catch-per-unit-effort and (standard error) for fishes collected by using day electrofishing in the open Mississippi River using fixed-site sampling during 1991. See text for definitions of catch-per-unit-effort and standard error.

Common name	MCBU	MCBW	SCB
Shovelnose sturgeon	0.00	0.00	0.13
	(0.00)	(0.00)	(0.13)
Spotted gar	0.00	0.06	0.00
	(0.00)	(0.06)	(0.00)
Longnose gar	0.04	0.00	0.00
	(0.04)	(0.00)	(0.00)
Shortnose gar	1.20	0.79	2.43
	(0.37)	(0.42)	(1.31)
Goldeye	2.10	0.97	0.25
	(1.05)	(0.47)	(0.14)
Mooneye	0.04	0.00	0.00
	(0.04)	(0.00)	(0.00)
American eel	0.00	0.71	0.00
	(0.00)	(0.36)	(0.00)
Skipjack herring	0.48	1.71	0.06
	(0.30)	(0.76)	(0.06)
Gizzard shad	46.98	26.73	46.12
	(15.15)	(6.17)	(13.24)
Threadfin shad	0.38	3.12	1.81
	(0.11)	(1.84)	(0.73)
Red shiner	0.54	0.60	11.88
	(0.24)	(0.37)	(8.94)
Common carp	1.74	2.12	2.88
	(0.69)	(0.63)	(1.86)
Speckled chub	0.11	0.00	0.00
	(0.11)	(0.00)	(0.00)
Silver chub	0.09	0.12	0.00
	(0.09)	(0.12)	(0.00)
Emerald shiner	1.31	1.41	0.75
	(0.59)	(1.00)	(0.43)
River shiner	0.57	0.00	0.63
	(0.29)	(0.00)	(0.63)
Silverband shiner	0.26	0.06	0.38
	(0.15)	(0.06)	(0.38)
Channel shiner	0.42	0.12	0.00
	(0.39)	(0.08)	(0.00)
Bluntnose minnow	0.04	0.00	0.00
	(0.04)	(0.00)	(0.00)
Bullhead minnow	0.00	0.00	0.43
	(0.00)	(0.00)	(0.32)
River carpsucker	3.09	2.05	2.18
	(1.65)	(1.87)	(0.97)
Quillback	0.00	0.06	0.06
	(0.00)	(0.06)	(0.06)
Smallmouth buffalo	0.00	0.24	0.87
	(0.00)	(0.14)	(0.56)
Bigmouth buffalo	0.00	0.00	0.38
	(0.00)	(0.00)	(0.31)
Blue catfish	0.00	1.29	0.00
	(0.00)	(0.83)	(0.00)
Channel catfish	3.20	2.61	1.31
	(1.07)	(0.69)	(0.64)
Freckled madtom	0.19	0.36	0.00
	(0.08)	(0.15)	(0.00)
Flathead catfish	0.54	2.02	0.44
	(0.25)	(0.40)	(0.18)
Northern studfish	0.05	0.00	0.00
	(0.05)	(0.00)	(0.00)
Brook silverside	0.04	0.18	0.00
	(0.04)	(0.18)	(0.00)

Strata: BWCS - Backwater, contiguous, shoreline
BWCO - Backwater, contiguous, offshore
IMPS - Impounded, shoreline
IMPO - Impounded, offshore
MCBU - Main channel border, unstructured
MCBW - Main channel border, wing dam
SCB - Side channel boarder
CTR - Main channel trough
TWZ - Tailwater

Table 5.3.1. Mean catch-per-unit-effort and (standard error) for fishes collected by using day electrofishing in the open Mississippi River using fixed-site sampling during 1991. See text for definitions of catch-per-unit-effort and standard error.

Common name	MCBU	MCBW	SCB
White bass	0.85	3.26	1.43
	(0.20)	(0.64)	(0.34)
Yellow bass	0.00	0.06	0.00
	(0.00)	(0.06)	(0.00)
Striped bass	0.04	0.18	0.00
	(0.04)	(0.10)	(0.00)
Green sunfish	0.00	0.24	0.63
	(0.00)	(0.11)	(0.45)
Orangespotted sunfish	0.00	0.62	0.31
	(0.00)	(0.51)	(0.15)
Bluegill	0.08	1.35	14.68
	(0.06)	(0.60)	(6.62)
Longear sunfish	0.00	0.06	0.06
	(0.00)	(0.06)	(0.0)
Spotted bass	0.00	0.24	0.31
	(0.00)	(0.14)	(0.18)
Largemouth bass	0.04	0.12	0.50
	(0.04)	(0.08)	(0.22)
White crappie	0.04	0.77	0.80
	(0.04)	(0.27)	(0.27)
Logperch	0.00	0.06	0.00
	(0.00)	(0.06)	(0.00)
Slenderhead darter	0.00	0.00	0.06
	(0.00)	(0.00)	(0.06)
Sauger	0.04	0.06	0.38
	(0.04)	(0.06)	(0.22)
Freshwater drum	2.37	2.39	4.56
	(0.71)	(0.66)	(2.12)

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TWZ - Tailwater

Table 5.3.2. Mean catch-per-unit-effort and (standard error) for fishes collected by using night electrofishing in the open Mississippi River using fixed-site sampling during 1991. See text for definitions of catch-per-unit-effort and standard error.

Common name	MCBU	SCB
Chestnut lamprey	0.13	0.09
	(0.13)	(0.09)
Paddlefish	0.06	0.09
	(0.06)	(0.09)
Longnose gar	0.19	0.27
	(0.14)	(0.19)
Shortnose gar	1.31	3.34
	(0.60)	(1.12)
Goldeye	0.71	0.55
	(0.39)	(0.25)
American eel	0.13	0.00
	(0.09)	(0.00)
Gizzard shad	7.75	41.44
	(2.47)	(14.62)
Threadfin shad	0.28	1.19
	(0.16)	(0.83)
Red shiner	0.32	2.57
	(0.16)	(1.67)
Blacktail shiner	0.00	0.09
	(0.00)	(0.09)
Common carp	1.47	0.97
	(0.68)	(0.37)
Speckled chub	0.06	0.09
	(0.06)	(0.09)
Silver chub	0.09	0.00
	(0.09)	(0.00)
Emerald shiner	0.44	2.48
	(0.26)	(1.13)
River shiner	0.06	0.85
	(0.06)	(0.57)
Silverband shiner	0.09	1.29
	(0.09)	(0.83)
Channel shiner	0.00	0.58
	(0.00)	(0.49)
Bluntnose minnow	0.00	0.09
	(0.00)	(0.09)
Bullhead minnow	0.00	0.10
	(0.00)	(0.10)
River carpsucker	0.97	2.89
	(0.57)	(2.51)
Quillback	0.06	0.18
	(0.06)	(0.12)
Smallmouth buffalo	0.19	0.26
	(0.14)	(0.19)
Blue catfish	0.00	0.09
	(0.00)	(0.09)
Channel catfish	3.34	5.97
	(1.77)	(3.41)
Freckled madtom	0.25	0.18
	(0.14)	(0.18)
Flathead catfish	0.88	0.36
	(0.34)	(0.20)
Brook silverside	0.13	0.00
	(0.09)	(0.00)
White bass	0.78	2.02
	(0.22)	(0.69)
Yellow bass	0.00	0.09
	(0.00)	(0.09)
Green sunfish	0.00	0.09
	(0.00)	(0.09)

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MCBW - Main channel border, wing dam
SCB - Side channel boarder
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TWZ - Tailwater

Table 5.3.2. Mean catch-per-unit-effort and (standard error) for fishes collected by using night electrofishing in the open Mississippi River using fixed-site sampling during 1991. See text for definitions of catch-per-unit-effort and standard error.

Common name	MCBU	SCB
Orangespotted sunfish	0.00	0.37
	(0.00)	(0.16)
Bluegill	0.19	1.92
	(0.14)	(0.87)
Longear sunfish	0.00	0.10
	(0.00)	(0.10)
Largemouth bass	0.00	0.27
	(0.00)	(0.19)
White crappie	0.00	0.64
	(0.00)	(0.36)
Sauger	0.06	0.56
	(0.06)	(0.22)
Freshwater drum	14.77	22.00
	(5.34)	(12.96)

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Table 5.3.3. Mean catch-per-unit-effort and (standard error) for fishes collected by using fyke netting in the open Mississippi River using fixed-site sampling during 1991. See text for definitions of catch-per-unit-effort and standard error.

Common name	MCBW	SCB
Longnose gar	0.00	0.03
	(0.00)	(0.03)
Shortnose gar	1.32	5.74
	(0.58)	(2.04)
Bowfin	0.00	0.03
	(0.00)	(0.03)
Goldeye	0.07	0.03
	(0.07)	(0.03)
Gizzard shad	0.62	1.09
	(0.42)	(0.34)
Threadfin shad	0.00	0.34
	(0.00)	(0.16)
Common carp	0.28	0.29
	(0.21)	(0.11)
River carpsucker	0.78	3.19
	(0.37)	(0.93)
Smallmouth buffalo	0.00	0.34
	(0.00)	(0.16)
Bigmouth buffalo	0.00	0.03
	(0.00)	(0.03)
Blue catfish	0.14	0.03
	(0.09)	(0.03)
Channel catfish	0.29	0.23
	(0.22)	(0.09)
Flathead catfish	0.23	0.30
	(0.17)	(0.19)
White bass	3.18	2.50
	(1.43)	(0.80)
Yellow bass	0.00	0.11
	(0.00)	(0.05)
Striped bass	0.00	0.03
	(0.00)	(0.03)
Bluegill	0.42	2.25
	(0.28)	(0.93)
Longear sunfish x bluegill	0.07	0.00
	(0.07)	(0.00)
Largemouth bass	0.00	0.03
	(0.00)	(0.03)
White crappie	0.65	5.30
	(0.27)	(1.37)
Black crappie	0.08	0.03
	(0.08)	(0.03)
Sauger	0.07	0.18
	(0.07)	(0.08)
Freshwater drum	3.78	0.74
	(1.49)	(0.20)

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Table 5.3.4. Mean catch-per-unit-effort and (standard error) for fishes collected by using mini fyke netting in the open Mississippi River using fixed-site sampling during 1991. See text for definitions of catch-per-unit-effort and standard error.

Common name	MCBW	SCB
Shortnose gar	0.00	0.34
	(0.00)	(0.16)
Gizzard shad	1.65	3.42
	(1.40)	(2.07)
Threadfin shad	0.56	0.04
	(0.49)	(0.04)
Red shiner	0.07	21.83
	(0.07)	(16.84)
Blacktail shiner	0.00	0.10
	(0.00)	(0.08)
Common carp	0.07	0.00
	(0.07)	(0.00)
Plains minnow	0.00	0.03
	(0.00)	(0.03)
Speckled chub	0.13	0.00
	(0.09)	(0.00)
Silver chub	0.00	0.10
	(0.00)	(0.08)
Golden shiner	0.00	0.03
	(0.00)	(0.03)
Emerald shiner	0.07	1.50
	(0.07)	(1.10)
River shiner	0.42	0.69
	(0.42)	(0.33)
Ghost shiner	0.07	0.03
	(0.07)	(0.03)
Ozark minnow	0.00	0.03
	(0.00)	(0.03)
Silverband shiner	1.56	12.29
	(0.63)	(6.58)
Channel shiner	0.53	15.13
	(0.39)	(10.83)
Bluntnose minnow	0.00	0.06
	(0.00)	(0.04)
Bullhead minnow	0.14	0.97
	(0.09)	(0.61)
River carpsucker	0.07	0.26
	(0.07)	(0.08)
Smallmouth buffalo	0.00	0.03
	(0.00)	(0.03)
Channel catfish	1.85	0.83
	(0.61)	(0.30)
Freckled madtom	0.05	0.16
	(0.05)	(0.08)
Flathead catfish	0.00	0.13
	(0.00)	(0.07)
Blackstripe topminnow	0.00	0.03
	(0.00)	(0.03)
Western mosquitofish	0.00	2.53
	(0.00)	(2.33)
Brook silverside	0.00	0.04
	(0.00)	(0.04)
White bass	0.12	0.32
	(0.09)	(0.17)
Green sunfish	0.00	0.07
	(0.00)	(0.05)
Warmouth	0.00	0.03
	(0.00)	(0.03)
Orangespotted sunfish	0.20	0.26
	(0.14)	(0.12)

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MCBW - Main channel border, wing dam
SCB - Side channel boarder
CTR - Main channel trough
TWZ - Tailwater

Table 5.3.4. Mean catch-per-unit-effort and (standard error) for fishes collected by using mini fyke netting in the open Mississippi River using fixed-site sampling during 1991. See text for definitions of catch-per-unit-effort and standard error.

Common name	MCBW	SCB
Bluegill	1.59	21.53
	(0.66)	(8.34)
Orangespotted sunfish x longear	0.00	0.03
	(0.00)	(0.03)
Largemouth bass	0.00	0.03
	(0.00)	(0.03)
White crappie	1.74	2.02
	(0.84)	(0.63)
Johnny darter	0.00	0.03
	(0.00)	(0.03)
Freshwater drum	5.77	2.32
	(2.53)	(1.13)

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MCBW - Main channel border, wing dam
SCB - Side channel boarder
CTR - Main channel trough
TWZ - Tailwater

Table 5.3.5. Mean catch-per-unit-effort and (standard error) for fishes collected by using tandem hoop netting in the open Mississippi River using fixed-site sampling during 1991. See text for definitions of catch-per-unit-effort and standard error.

Common name	MCBU	MCBW	SCB
Shortnose gar	0.04	0.06	0.00
	(0.03)	(0.06)	(0.00)
American eel	0.00	0.06	0.00
	(0.00)	(0.06)	(0.00)
Gizzard shad	0.05	0.06	0.00
	(0.05)	(0.06)	(0.00)
Common carp	0.02	0.12	0.00
	(0.02)	(0.12)	(0.00)
River carpsucker	0.14	0.44	0.25
	(0.10)	(0.38)	(0.25)
Blue sucker	0.02	0.00	0.00
	(0.02)	(0.00)	(0.00)
Smallmouth buffalo	0.11	0.00	0.00
	(0.05)	(0.00)	(0.00)
Shorthead redhorse	0.02	0.00	0.00
	(0.02)	(0.00)	(0.00)
Blue catfish	0.07	0.00	0.12
	(0.04)	(0.00)	(0.12)
Channel catfish	5.33	0.26	15.31
	(1.87)	(0.14)	(12.93)
Freckled madtom	0.02	0.06	0.00
	(0.02)	(0.06)	(0.00)
Flathead catfish	0.41	0.00	0.25
	(0.13)	(0.00)	(0.25)
White bass	0.07	0.06	0.13
	(0.05)	(0.06)	(0.13)
Sauger	0.05	0.06	0.00
	(0.03)	(0.06)	(0.00)
Freshwater drum	0.46	0.45	4.49
	(0.13)	(0.18)	(2.15)

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SCB - Side channel boarder
CTR - Main channel trough
TWZ - Tailwater

Table 5.3.6. Mean catch-per-unit-effort and (standard error) for fishes collected by using seining in the open Mississippi River using fixed-site sampling during 1991. See text for definitions of catch-per-unit-effort and standard error.

Common name	MCBU	SCB
Shovelnose sturgeon	0.02	0.00
	(0.02)	(0.00)
Shortnose gar	0.05	0.27
	(0.03)	(0.11)
Goldeye	0.30	0.29
	(0.15)	(0.29)
Mooneye	0.02	0.00
	(0.02)	(0.00)
Skipjack herring	0.02	0.02
	(0.02)	(0.02)
Gizzard shad	1.13	16.11
	(0.49)	(11.32)
Threadfin shad	0.27	4.77
	(0.14)	(2.84)
Central stoneroller	0.02	0.02
	(0.02)	(0.02)
Red shiner	0.63	18.41
	(0.44)	(10.09)
Speckled chub	1.06	0.11
	(0.82)	(0.08)
Silver chub	0.00	0.11
	(0.00)	(0.05)
Emerald shiner	4.34	10.25
	(2.03)	(6.72)
River shiner	4.84	5.68
	(2.65)	(5.09)
Bigeye shiner	0.00	0.04
	(0.00)	(0.04)
Silverband shiner	0.30	10.25
	(0.09)	(9.89)
Sand shiner	0.03	0.05
	(0.03)	(0.04)
Channel shiner	0.58	20.84
	(0.19)	(20.38)
Bullhead minnow	0.00	0.13
	(0.00)	(0.08)
River carpsucker	1.44	8.18
	(0.57)	(5.10)
Smallmouth buffalo	0.02	0.07
	(0.02)	(0.06)
Blue catfish	0.03	0.00
	(0.02)	(0.00)
Channel catfish	2.17	0.70
	(1.01)	(0.25)
Freckled madtom	0.00	0.02
	(0.00)	(0.02)
Western mosquitofish	0.00	2.16
	(0.00)	(2.05)
Brook silverside	0.00	0.09
	(0.00)	(0.06)
White bass	0.02	0.39
	(0.02)	(0.15)
Bluegill	0.02	1.36
	(0.0)	(0.78)
White crappie	0.00	0.07
	(0.00)	(0.04)
Freshwater drum	0.17	1.66
	(0.08)	(0.52)

Strata: BWCS - Backwater, contiguous, shoreline
BWCO - Backwater, contiguous, offshore
IMPS - Impounded, shoreline
IMPO - Impounded, offshore
MCBU - Main channel border, unstructured
MCBW - Main channel border, wing dam
SCB - Side channel boarder
CTR - Main channel trough
TWZ - Tailwater

Table 5.3.7. Mean catch-per-unit-effort and (standard error) for fishes collected by using bottom trawling in the open Mississippi River using fixed-site sampling during 1991. See text for definitions of catch-per-unit-effort and standard error.

Common name	MCBU	SCB
Shovelnose sturgeon	0.54	0.25
	(0.18)	(0.16)
Goldeye	0.05	0.00
	(0.04)	(0.00)
Skipjack herring	0.04	0.00
	(0.02)	(0.00)
Gizzard shad	0.02	0.00
	(0.02)	(0.00)
Red shiner	0.00	0.13
	(0.00)	(0.13)
Common carp	0.04	0.00
	(0.02)	(0.00)
Speckled chub	0.26	0.25
	(0.11)	(0.25)
Sicklefin chub	0.04	0.00
	(0.04)	(0.00)
Silver chub	0.04	0.00
	(0.02)	(0.00)
Silverband shiner	0.28	0.13
	(0.19)	(0.13)
Channel shiner	0.00	0.13
	(0.00)	(0.13)
River carpsucker	0.00	2.38
	(0.00)	(1.63)
Smallmouth buffalo	0.04	0.00
	(0.02)	(0.00)
Blue catfish	5.09	0.88
	(2.07)	(0.74)
Channel catfish	8.53	13.13
	(3.40)	(5.75)
Freckled madtom	0.00	0.00
	(0.00)	(0.00)
Flathead catfish	0.04	0.00
	(0.02)	(0.00)
White bass	0.05	0.00
	(0.05)	(0.00)
Orangespotted sunfish	0.02	0.00
	(0.02)	(0.00)
Freshwater drum	5.74	2.88
	(2.41)	(2.33)

Strata: BWCS - Backwater, contiguous, shoreline
BWCO - Backwater, contiguous, offshore
IMPS - Impounded, shoreline
IMPO - Impounded, offshore
MCBU - Main channel border, unstructured
MCBW - Main channel border, wing dam
SCB - Side channel boarder
CTR - Main channel trough
TWZ - Tailwater

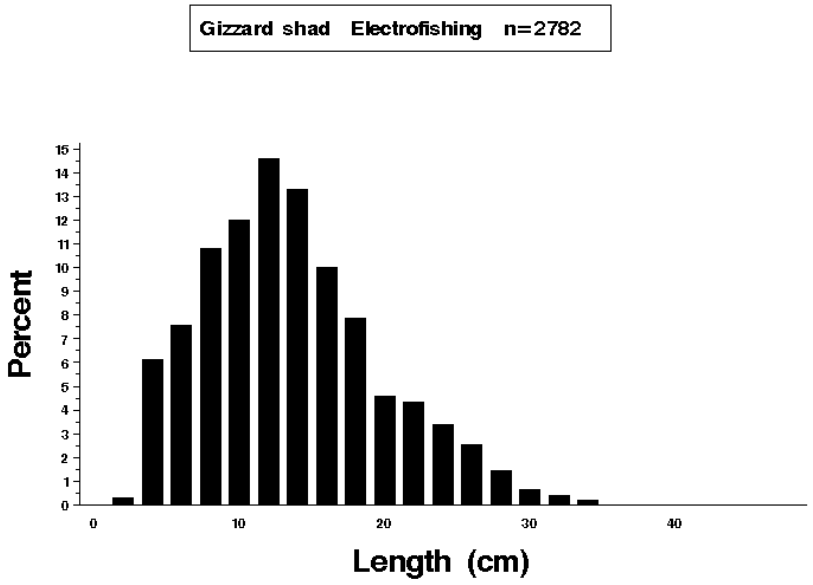

Figure 5.2. Length distributions (*length*) as a percentage of catch (*percent*) for gizzard shad (*Dorosoma cepedianum*) collected by electrofishing in the Upper Mississippi River Open Reach during 1991.

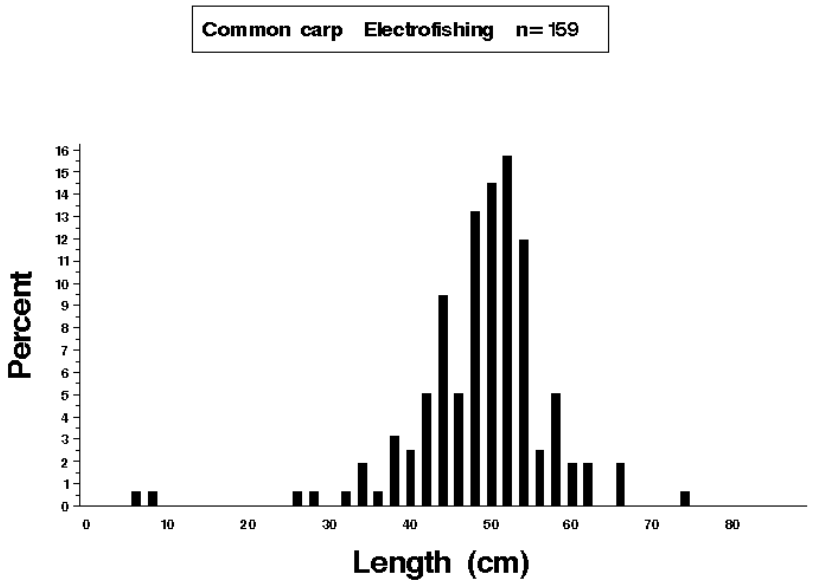

Figure 5.3. Length distributions (*length*) as a percentage of catch (*percent*) for common carp (*Cyprinus carpio*) collected by electrofishing in the Upper Mississippi River Open Reach during 1991.

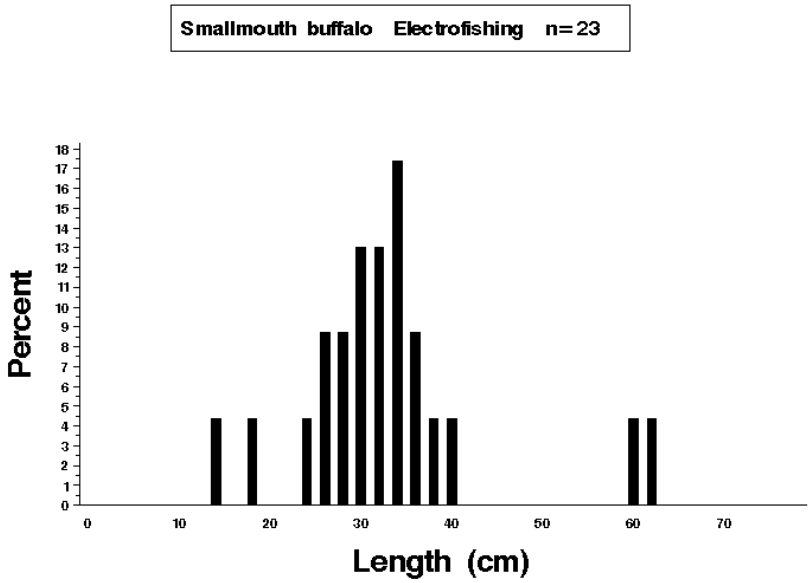

Figure 5.4. Length distributions (*length*) as a percentage of catch (*percent*) for smallmouth buffalo (*Ictiobus bubalus*) collected by electrofishing in the Upper Mississippi River Open Reach during 1991.

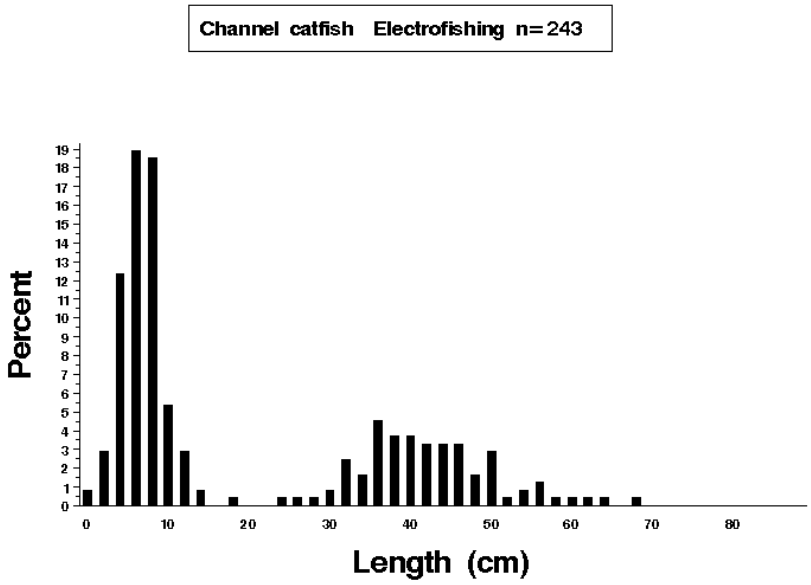

Figure 5.5. Length distributions (*length*) as a percentage of catch (*percent*) for channel catfish (*Ictalurus punctatus*) collected by electrofishing in the Upper Mississippi River Open Reach during 1991.

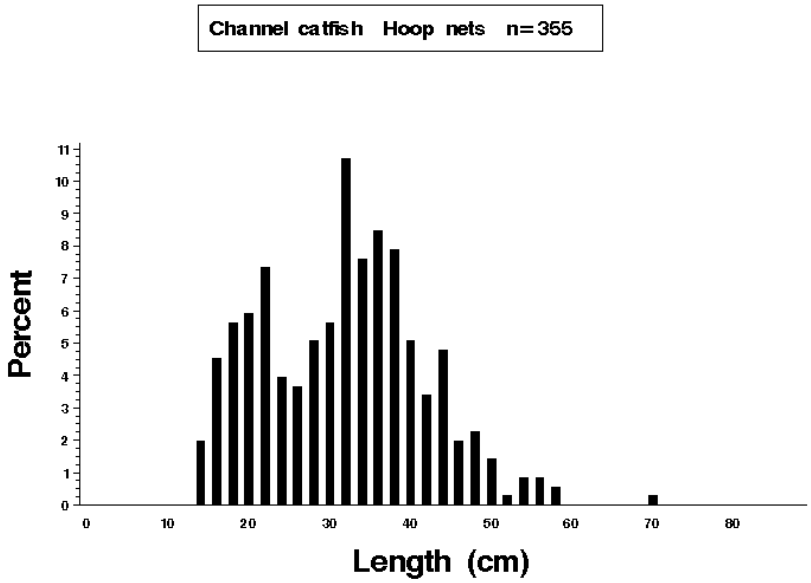

Figure 5.6. Length distributions (*length*) as a percentage of catch (*percent*) for channel catfish (*Ictalurus punctatus*) collected by large and small hoop netting in the Upper Mississippi River Open Reach during 1991.

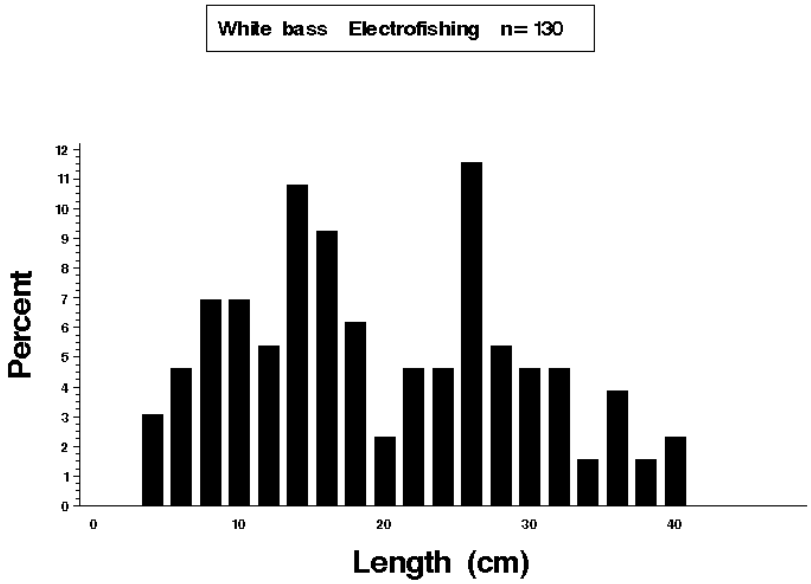

Figure 5.7. Length distributions (*length*) as a percentage of catch (*percent*) for white bass (*Morone chryops*) collected by electrofishing in the Upper Mississippi River Open Reach during 1991.

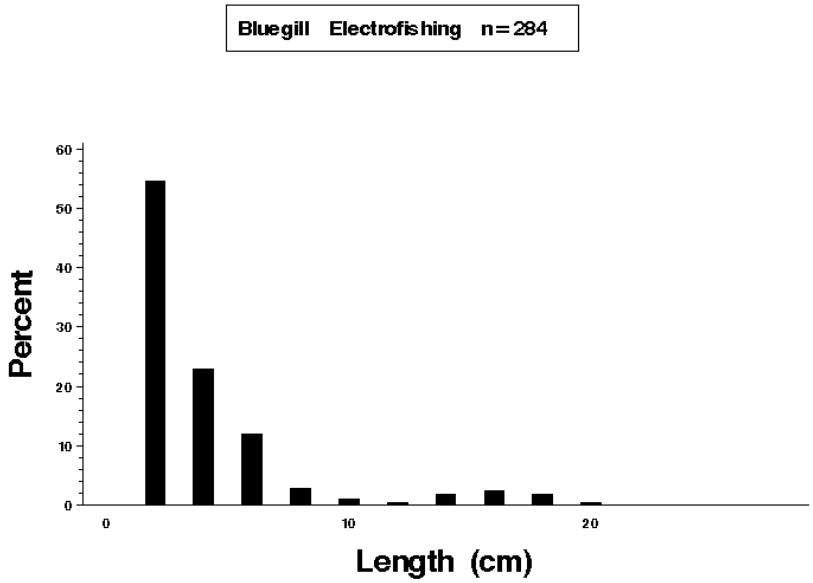

Figure 5.8. Length distributions (*length*) as a percentage of catch (*percent*) for bluegill (*Lepomis macrochirus*) collected by electrofishing in the Upper Mississippi River Open Reach during 1991.

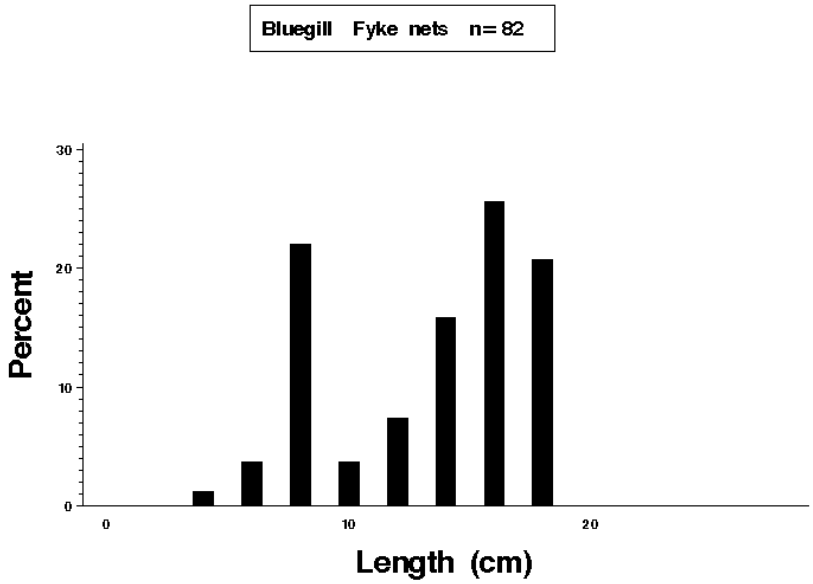

Figure 5.9. Length distributions (*length*) as a percentage of catch (*percent*) for bluegill (*Lepomis macrochirus*) collected by fyke netting in the Upper Mississippi River Open Reach during 1991.

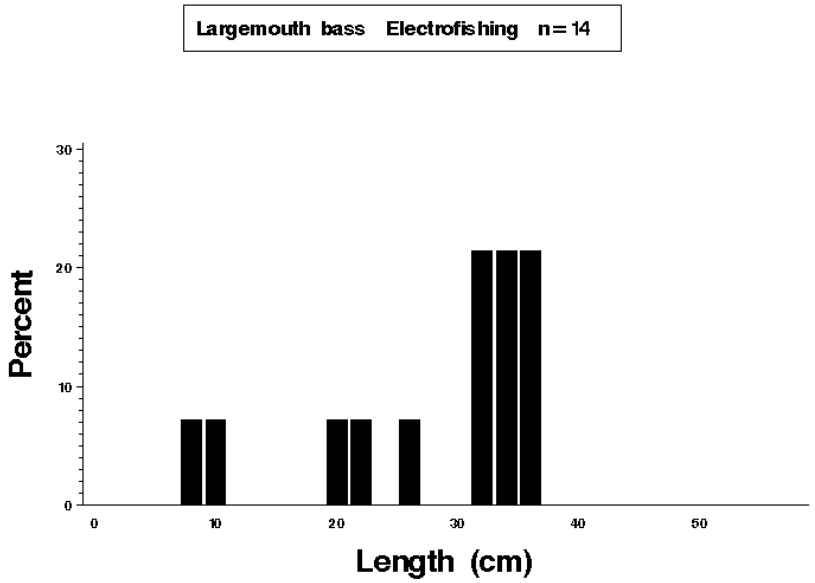

Figure 5.10. Length distributions (*length*) as a percentage of catch (*percent*) for largemouth bass (*Micropterus salmoides*) collected by fyke netting in the Upper Mississippi River Open Reach during 1991.

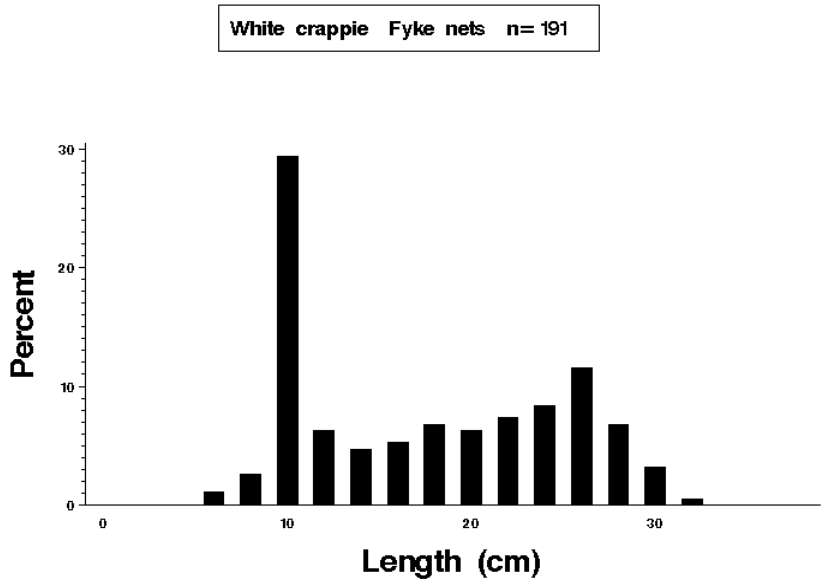

Figure 5.11. Length distributions (*length*) as a percentage of catch (*percent*) for white crappie (*Pomoxis annularus*) collected by fyke netting in the Upper Mississippi River Open Reach during 1991.

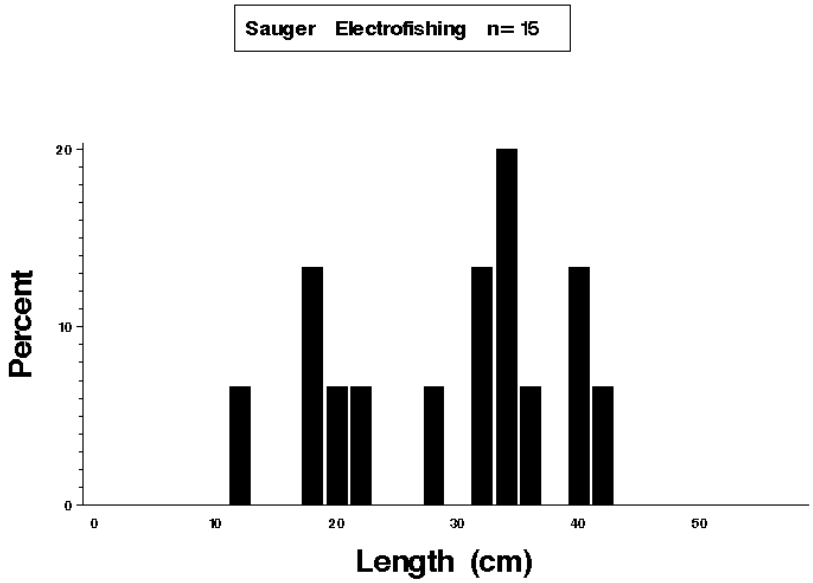

Figure 5.12. Length distributions (*length*) as a percentage of catch (*percent*) for freshwater drum (*Aplodinotus grunniens*) collected by electrofishing in the Upper Mississippi River Open Reach during 1991.

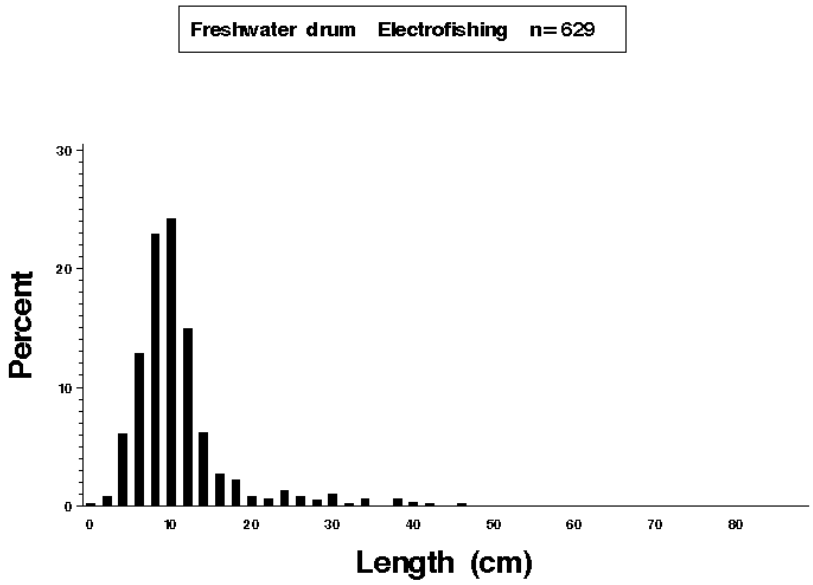

Figure 5.13. Length distributions (*length*) as a percentage of catch (*percent*) for freshwater drum (*Aplodinotus grunniens*) collected by electrofishing in the Upper Mississippi River Open Reach during 1991.

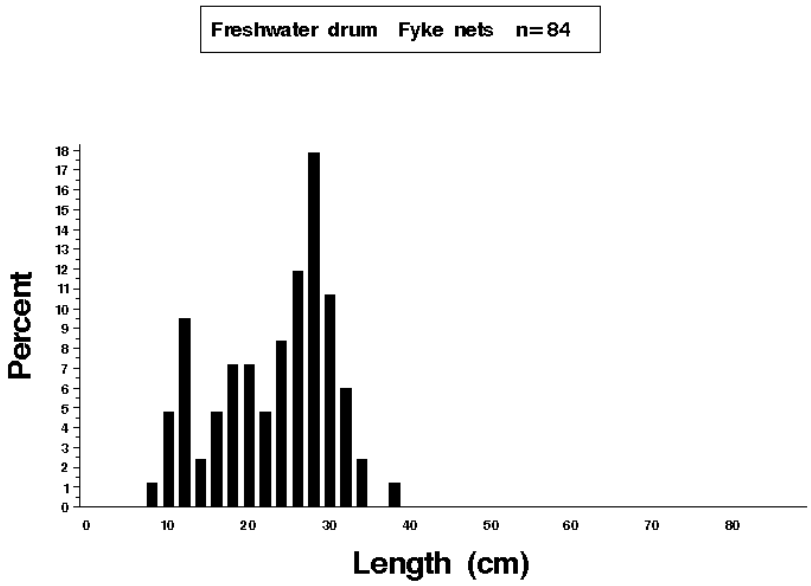

Figure 5.14. Length distributions (*length*) as a percentage of catch (*percent*) for freshwater drum (*Aplodinotus grunniens*) collected by fyke netting in the Upper Mississippi River Open Reach during 1991.

Chapter 6. La Grange Pool, Illinois River

by

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Hydrograph

Illinois River levels at Havana, Illinois, were representative of conditions on La Grange Pool in 1991 (Figure 6.1). Although river levels were above average through May, they began falling in early June; levels fell 10.8 feet in 22 days. River levels remained below average from late June throughout September. In early October, river levels rose about 5 feet, but declined by mid-month. River levels rose again in November after our sampling was completed and they remained high throughout December. The U.S. Army Corps of Engineers discharge data were obtained from the Environmental Management Technical Center (Wlosinski et al. 1995).

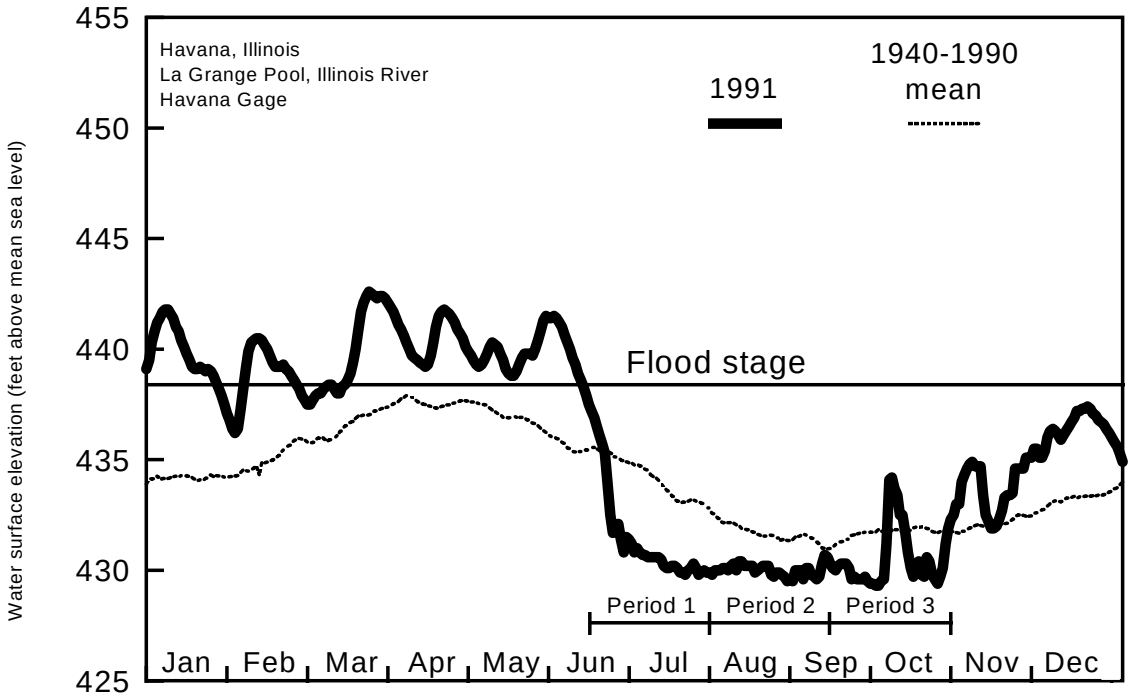

Figure 6.1. Daily water surface elevation from Havana Gage for La Grange Pool, Illinois River, during 1991 and mean elevation since 1940. The U.S. Army Corps of Engineers discharge data were obtained from the Environmental Management Technical Center (Wlosinski et al. 1995).

Summary of Sampling Effort

We made 263 collections at fixed sites in 1996–89 in period 1, 82 in period 2, and 92 in period 3 (Table 6.2). We made more collections in 1991 than in 1990 because of changes in sampling protocol and the addition of two new sites. Low river levels hindered sampling at backwater sites during all three periods, but we were able to complete some backwater sampling during each period.

Total Catch by Gear

Historical records indicate that 115 fish species and three hybrid crosses have been collected from La Grange Pool since the late 1800s (Smith 1979). During 1991, we collected 58,009 fish representing 57 species and two hybrid crosses (Table 6.2). Sixteen species and one hybrid collected in 1992 were new records for Long Term Resource Monitoring Program sampling in La Grange Pool (longnose gar, American eel, red shiner, golden shiner, silverband shiner, sand shiner, suckermouth minnow, silver redhorse, blue catfish, stonecat, northern pike, blackstripe topminnow, pumpkinseed, orange spotted sunfish, longear sunfish, johnny darter, and green sunfish × bluegill). The five most abundant species were the threadfin shad (20,060), bluegill (7,679), gizzard shad (6,417), common carp (5,666), and channel catfish (4,382). Total species collected by gear type, excluding hybrids, were 34 by day electrofishing, 49 by night electrofishing, 42 by fyke netting, 24 by mini fyke netting, 34 by seining, 22 by tandem hoop netting, and 16 by trawling. Our combined catch for 1990 and 1991 consisted of 62,798 fish representing 59 species and two hybrids.

Fixed Sampling, Mean *C/f* by Gear and Stratum

Day Electrofishing

Bluegill had the highest mean *C/f* (86.62) for day electrofishing (Table 6.3.1) in the BWCS stratum, followed by largemouth bass (16.17) and common carp (14.59). In the MCBU stratum, gizzard shad had the highest *C/f* (16.09), followed by freshwater drum (11.36) and channel catfish (10.67).

Night Electrofishing

Gizzard shad had the highest mean *C/f* (57.39) for night electrofishing (Table 6.3.2) in the BWCS stratum, followed by bluegill (46.86) and freshwater drum (37.33). For night electrofishing in the MCBU stratum, freshwater drum had the highest *C/f* (25.30), followed by gizzard shad (22.78) and common carp (13.62). Bluegill had the highest *C/f* (30.45) in the SCB stratum, followed by common carp (20.45) and gizzard shad (18.32). In the TWZ stratum, gizzard shad had the highest *C/f* (181.91), followed by white bass (151.22) and bluegill (76.91).

Fyke Net

Threadfin shad had the highest mean *C/f* (188.26) for fyke netting (Table 6.3.3) in the BWCS stratum, followed by bluegill (104.48) and black crappie (68.98). Bluegill also had the highest *C/f* (418.65) in the TWZ stratum, followed by black crappie (168.80) and white crappie (77.18).

Mini Fyke Net

For mini fyke netting in the BWCS stratum (Table 6.3.4), threadfin shad had the highest *C/f* (3,848.77), followed by gizzard shad (219.42) and skipjack herring (208.95). In the TWZ stratum, gizzard shad had the highest *C/f* (24.15), followed by green sunfish (12.80) and bluegill (5.68).

Tandem Hoop Net

Common carp had the highest *C/f* (59.48) for tandem hoop nets in the MCBU stratum (Table 6.3.5), followed by channel catfish (35.84) and freshwater drum (2.69). In the SCB stratum, channel catfish had the highest *C/f* (58.27), followed by common carp (29.66) and smallmouth buffalo (1.77). In the TWZ stratum, common carp had the highest *C/f* (86.27), followed by channel catfish (8.71) and white bass (3.78).

Seine

For seining in the BWCS stratum (Table 6.3.6), gizzard shad had the highest *C/f* (10.67), followed by emerald shiner (8.33) and bluegill (5.75). Threadfin shad had the highest *C/f* (31.92) in the MCBU stratum, followed by gizzard shad (24.58) and emerald shiner (18.00). Threadfin shad also had the highest *C/f* (122.71) in the SCB stratum, followed by gizzard shad (18.17) and freshwater drum (12.96).

Trawl

By trawling, freshwater drum had the highest *C/f* (6.50) in the MCBU stratum (Table 6.3.7), followed by channel catfish (1.46) and common carp (0.63). In the CTR stratum, freshwater drum had the highest *C/f* (3.26), followed by channel catfish (1.00) and common carp (0.13). In the TWZ stratum, freshwater drum had the highest *C/f* (16.67), followed by channel catfish (5.50) and common carp (0.83).

Length Distributions of Selected Species

Gizzard Shad

Gizzard shad lengths from day and night electrofishing ranged from 2 to 34 cm, with about 58% of the 3,025 fish being from 2 to 14 cm (Figure 6.2), with the peak at 10 cm. Two other peaks were present at 18 and 22 cm.

Common Carp

The length distribution of 1,408 common carp from electrofishing (Figure 6.3) indicated an almost normal distribution, with a peak between 28 and 36 cm. Common carp lengths ranged from 18 to 68 cm.

Smallmouth Buffalo

We collected 250 smallmouth buffalo by electrofishing (Figure 6.4); their lengths ranged from 10 to 50 cm. The distribution had peaks at 20, 26, 30, and 36 cm.

Tandem hoop net collections of 115 smallmouth buffalo illustrated a fairly uniform distribution of fish from 20 to 54 cm (Figure 6.5). Smallmouth buffalo less than 20 cm were not collected by tandem hoop netting during 1991.

Channel Catfish

The length distribution of 314 channel catfish collected by electrofishing had peaks at 16 and 38 cm, with a smaller peak at 2 cm (Figure 6.6). A wide range of lengths between 2 and 64 cm were present.

Of the 3,847 channel catfish collected by tandem hoop netting (Figure 6.7), 95% were between 14 and 22 cm long. Their lengths ranged from 10 to 58 cm.

Northern Pike

No northern pike were collected in La Grange Pool during 1991 (Table 6.2).

White Bass

Two broad peaks were present in the length distribution of the 1,362 white bass collected by electrofishing (Figure 6.8). One peak was between 8 and 10 cm and the other centered at 22 cm. White bass lengths ranged from 2 to 38 cm.

Bluegill

Of the 2,633 bluegill collected by electrofishing (Figure 6.9), more than 92% were between 10 and 14 cm long. Their lengths ranged from 2 to 18 cm.

From fyke nets, 4,477 bluegill were collected (Figure 6.10) ranging from 8 to 16 cm. As with electrofishing, a large percentage (95%) of the bluegill were between 10 and 14 cm long.

Largemouth Bass

The length distribution of 684 largemouth bass collected by electrofishing (Figure 6.11) indicated fish were distributed between 2 and 44 cm. The distribution is almost normal, with a peak at 18 cm.

White Crappie

We collected 747 white crappie from fyke nets (Figure 6.12). Their lengths were between 10 and 28 cm. More than 87% were from 12 to 16 cm.

Black Crappie

We collected 2,331 black crappie in fyke nets in 1991 (Figure 6.13). They ranged from 10 to 32 cm in length. More than 70% of these fish were between 12 and 16 cm.

Sauger

We collected 122 sauger during electrofishing in 1991 (Figure 6.14). Lengths ranged from 6 to 44 cm. Peaks were present at 8, 16, and 32 cm.

Walleye

Three walleye were collected by LTRMP during electrofishing in La Grange Pool during 1991 (Table 6.2). Because of the small sample size, length distributions were not constructed for this report.

Freshwater Drum

We collected 1,346 freshwater drum during electrofishing in 1991 (Figure 6.15). The major peaks were at 10 cm, with two smaller peaks at 2 and 30 cm. These fish ranged from 2 to 44 cm in length.

We collected 372 freshwater drum in fyke nets (Figures 6.16). They ranged from 10 to 44 cm in length. There was a major peak in the distribution between 14 and 18 cm, with another peak at 26 cm.

Table 6.1. Allocation of fish sampling effort among strata by the Long Term Resource Monitoring Program in the La Grange Pool of the Illinois River during 1991. Table entries are numbers of successfully completed standardized monitoring collections.

Sampling period = 1: June 15 - July 31

Sampling gear	BWCS	BWCO	SCB	MCBU	MCBW	IMPS	IMPO	CTR	TWZ	TOTAL
Day electrofishing	3			4						7
Fyke net	5								2	7
Tandem hoop net			8	4					2	14
Mini fyke net	1								2	3
Night electrofishing	4		8	4					2	18
Seine	4		8	4						16
Trawling				8				6	10	24
SUBTOTAL	17	0	24	24	0	0	0	6	18	89

Sampling period = 2: August 1 - September 14

Sampling gear	BWCS	BWCO	SCB	MCBU	MCBW	IMPS	IMPO	CTR	TWZ	TOTAL
Day electrofishing				4						4
Fyke net	4								2	6
Tandem hoop net			8	4					2	14
Mini fyke net									2	2
Night electrofishing	1		8	4					2	15
Seine	4		8	4						16
Trawling				8				13	4	25
SUBTOTAL	9	0	24	24	0	0	0	13	12	82

Sampling period = 3: September 15 - October 31

Sampling gear	BWCS	BWCO	SCB	MCBU	MCBW	IMPS	IMPO	CTR	TWZ	TOTAL
Day electrofishing				4						4
Fyke net	10								2	12
Tandem hoop net			8	4					2	14
Mini fyke net	2								2	4
Night electrofishing	4		8	4					2	18
Seine	4		8	4						16
Trawling				8				12	4	24
SUBTOTAL	20	0	24	24	0	0	0	12	12	92
	46	0	72	72	0	0	0	31	42	263

Strata: BWCS - Backwater, contiguous, shoreline.
BWCO - Backwater, contiguous, offshore.
IMPS - Impounded, shoreline.
IMPO - Impounded, offshore.
MCBU - Main channel border, unstructured.
MCBW - Main channel border, wing dam.
SCB - Side channel border.
CTR - Main channel trough.
TWZ - Tailwater.

Table 6.2. Total catches, by gear type, of fishes collected by the Long Term Resource Program during 1991 in the La Grange Pool of the Illinois River. See Table 6.1 for the list of sampling gears actually deployed in this study reach.

Species	Common name	Scientific name	D	N	F	X	M	Y	S	H	T	TOTAL
1	Spotted gar	Lepisosteus oculatus	-	1	16	-	-	-	-	-	-	17
2	Longnose gar	Lepisosteus osseus	-	4	10	-	-	-	1	-	-	15
3	Shortnose gar	Lepisosteus platostomus	1	38	263	-	2	-	2	-	-	306
4	Bowfin	Amia calva	1	3	16	-	-	-	-	-	-	20
5	American eel	Anguilla rostrata	-	-	1	-	-	-	-	-	-	1
6	Skipjack herring	Alosa chrysochloris	10	4	21	-	679	-	203	1	-	918
7	Gizzard shad	Dorosoma cepedianum	235	2790	1655	-	860	-	859	14	4	6417
8	Threadfin shad	Dorosoma petenense	101	282	3821	-	12493	-	3361	-	2	20060
9	Goldfish	Carassius auratus	1	18	2	-	-	-	-	-	-	21
10	Red shiner	Cyprinella lutrensis	-	2	-	-	-	-	44	-	-	46
11	Common carp	Cyprinus carpio	172	1236	297	-	-	-	14	3913	34	5666
12	Goldfish x carp	Carassius auratus x C. carpio	1	2	-	-	-	-	-	2	-	5
13	Silver chub	Macrhybopsis storeriana	5	48	-	-	2	-	102	-	2	159
14	Golden shiner	Notemigonus crysoleucas	-	1	2	-	-	-	1	-	-	4
15	Emerald shiner	Notropis atherinoides	24	88	1	-	8	-	484	-	-	605
16	Spottail shiner	Notropis hudsonius	1	1	-	-	30	-	-	-	-	32
17	Silverband shiner	Notropis shumardi	-	4	-	-	21	-	7	-	1	33
18	Sand shiner	Notropis stramineus	-	2	-	-	-	-	-	-	-	2
19	Suckermouth minnow	Phenacobius mirabilis	-	-	-	-	-	-	6	-	-	6
20	Bullhead minnow	Pimephales vigilax	-	2	-	-	2	-	66	-	-	70
21	River carpsucker	Carpiodes carpio	10	136	58	-	1	-	13	28	2	248
22	Quillback	Carpiodes cyprinus	1	10	14	-	-	-	-	5	-	30
23	Highfin carpsucker	Carpiodes velifer	4	17	5	-	-	-	-	1	-	27
24	White sucker	Catostomus commersoni	-	2	4	-	-	-	-	-	-	6
25	Smallmouth buffalo	Ictiobus bubalus	30	220	57	-	-	-	5	115	-	427
26	Bigmouth buffalo	Ictiobus cprinellus	3	218	35	-	-	-	-	3	-	259
27	Black buffalo	Ictiobus niger	1	16	2	-	-	-	1	6	-	26
28	Silver redhorse	Moxostoma anisurum	-	1	1	-	-	-	-	-	-	2
29	Golden redhorse	Moxostoma erythrurum	1	10	3	-	-	-	-	-	-	14
30	Shorthead redhorse	Moxostoma macrolepidotum	1	29	70	-	-	-	-	12	1	113
31	Black bullhead	Ameiurus melas	-	9	53	-	6	-	1	9	2	80
32	Yellow bullhead	Ameiurus natalis	1	1	37	-	1	-	-	3	-	43
33	Brown bullhead	Ameiurus nebulosus	3	2	49	-	-	-	-	10	2	66
34	Blue catfish	Ictalurus furcatus	-	-	-	-	-	-	-	1	-	1
35	Channel catfish	Ictalurus punctatus	144	170	37	-	2	-	17	3847	165	4382
36	Stonecat	Noturus flavus	-	-	-	-	-	-	-	1	2	3
37	Flathead catfish	Pylodictis olivaris	2	30	5	-	1	-	-	26	4	68
38	Northern pike	Esox lucius	-	-	1	-	-	-	-	-	-	1
39	Blackstripe topminnow	Fundulus notatus	-	2	-	-	-	-	22	-	-	24
40	Western mosquitofish	Gambusia affinis	-	4	-	-	-	-	36	-	-	40

Gears: D - Day electrofshing
N - Night electrofishing
F - Fyke netting
M - Mini fyke netting
T - Trawling (4.8-m bottom trawl)
S - Seining
H - Small and large hoop netting
X - Tandem fyke netting
Y - Tandem mini fyke netting

Table 6.2. Total catches, by gear type, of fishes collected by the Long Term Resource Program during 1991 in the La Grange Pool of the Illinois River. See Table 6.1 for the list of sampling gears actually deployed in this study reach.

Species	Common name	Scientific name	D	N	F	X	M	Y	S	H	T	TOTAL
41	Brook silverside	Labidesthes sicculus	-	24	-	-	-	-	21	-	-	45
42	White bass	Morone chrysops	74	1288	590	-	3	-	84	44	-	2083
43	Yellow bass	Morone mississippiensis	8	22	40	-	1	-	1	-	-	72
44	Green sunfish	Lepomis cyanellus	38	169	78	-	77	-	2	-	-	364
45	Pumpkinseed	Lepomis gibbosus	3	5	15	-	5	-	-	-	-	28
46	Warmouth	Lepomis gulosus	4	13	3	-	-	-	1	-	-	21
47	Orangespotted sunfish	Lepomis humilis	1	-	3	-	-	-	1	-	-	5
48	Bluegill	Lepomis macrochirus	401	2232	4477	-	265	-	299	-	5	7679
49	Longear sunfish	Lepomis megalotis	-	1	-	-	-	-	-	-	-	1
50	Redear sunfish	Lepomis microlophus	-	-	1	-	-	-	-	-	-	1
51	Green sunfish x bluegill	L. cyanellus x L. macrochirus	1	4	2	-	-	-	-	-	-	7
52	Largemouth bass	Micropterus salmoides	165	519	105	-	3	-	16	-	-	808
53	White crappie	Pomoxis annularis	9	155	747	-	22	-	4	4	1	942
54	Black crappie	Pomoxis nigromaculatus	41	253	2331	-	19	-	27	11	-	2682
55	Johnny darter	Etheostoma nigrum	-	-	-	-	-	-	5	-	-	5
56	Logperch	Percina caprodes	-	5	-	-	2	-	2	-	-	9
57	Sauger	Stizostedion canadense	9	113	28	-	-	-	2	1	1	154
58	Walleye	Stizostedion vitreum	-	3	3	-	-	-	-	-	-	6
59	Freshwater drum	Aplodinotus grunniens	168	1178	372	-	7	-	393	159	557	2834
			1675	11387	15331	0	14512	0	6103	8216	785	58009

Gears: D - Day electrofishing
N - Night electrofishing
F - Fyke netting
M - Mini fyke netting
T - Trawling (4.8-m bottom trawl)
S - Seining
H - Small and large hoop netting
X - Tandem fyke netting
Y - Tandem mini fyke netting

Table 6.3.1. Mean catch-per-unit-effort and (standard error) for fishes collected by using day electrofishing in the La Grange Pool of the Illinois River using fixed-site sampling during 1991. See text for definitions of catch-per-unit-effort and standard error.

Common name	BWCS	MCBU
Shortnose gar	0.00	0.06
	(0.00)	(0.06)
Bowfin	0.26	0.00
	(0.26)	(0.00)
Skipjack herring	0.00	0.76
	(0.00)	(0.33)
Gizzard shad	12.42	16.09
	(7.11)	(7.90)
Threadfin shad	0.00	8.31
	(0.00)	(2.50)
Goldfish	0.00	0.09
	(0.00)	(0.09)
Common carp	14.59	9.73
	(8.04)	(3.16)
Goldfish x carp	0.00	0.09
	(0.00)	(0.09)
Silver chub	0.00	0.36
	(0.00)	(0.17)
Emerald shiner	0.59	1.69
	(0.59)	(0.75)
Spottail shiner	0.00	0.06
	(0.00)	(0.06)
River carpsucker	1.96	0.26
	(0.83)	(0.18)
Quillback	0.29	0.00
	(0.29)	(0.00)
Highfin carpsucker	0.50	0.15
	(0.50)	(0.10)
Smallmouth buffalo	7.05	0.26
	(3.13)	(0.13)
Bigmouth buffalo	0.78	0.00
	(0.45)	(0.00)
Black buffalo	0.26	0.00
	(0.26)	(0.00)
Golden redhorse	0.00	0.09
	(0.00)	(0.09)
Shorthead redhorse	0.00	0.08
	(0.00)	(0.08)
Yellow bullhead	0.26	0.00
	(0.26)	(0.00)
Brown bullhead	0.00	0.24
	(0.00)	(0.18)
Channel catfish	1.31	10.67
	(0.47)	(2.43)
Flathead catfish	0.00	0.17
	(0.00)	(0.11)
White bass	1.06	5.43
	(0.22)	(0.81)
Yellow bass	0.56	0.51
	(0.28)	(0.20)
Green sunfish	7.79	0.63
	(4.02)	(0.27)
Pumpkinseed	0.78	0.00
	(0.45)	(0.00)
Warmouth	1.04	0.00
	(0.70)	(0.00)
Orangespotted sunfish	0.25	0.00
	(0.25)	(0.00)
Bluegill	86.62	4.97
	(33.67)	(1.10)

Strata: BWCS - Backwater, contiguous, shoreline
BWCO - Backwater, contiguous, offshore
IMP - Impounded, shoreline
IMPO - Impounded, offshore
MCBU - Main channel border, unstructured
MCBW - Main channel border, wing dam
SCB - Side channel boarder
CTR - Main channel trough
TWZ - Tailwater

Table 6.3.1. Mean catch-per-unit-effort and (standard error) for fishes collected by using day electrofishing in the La Grange Pool of the Illinois River using fixed-site sampling during 1991. See text for definitions of catch-per-unit-effort and standard error.

Common name	BWCS	MCBU
Green sunfish x bluegill	0.00	0.09
	(0.00)	(0.09)
Largemouth bass	16.17	7.58
	(2.46)	(1.56)
White crappie	0.52	0.52
	(0.52)	(0.27)
Black crappie	7.64	0.94
	(1.53)	(0.32)
Sauger	1.77	0.24
	(1.77)	(0.12)
Freshwater drum	7.58	11.36
	(3.41)	(3.22)

Strata: BWCS - Backwater, contiguous, shoreline
BWCO - Backwater, contiguous, offshore
IMPS - Impounded, shoreline
IMPO - Impounded, offshore
MCBU - Main channel border, unstructured
MCBW - Main channel border, wing dam
SCB - Side channel boarder
CTR - Main channel trough
TWZ - Tailwater

Table 6.3.2. Mean catch-per-unit-effort and (standard error) for fishes collected by using night electrofishing in the La Grange Pool of the Illinois River using fixed-site sampling during 1991. See text for definitions of catch-per-unit-effort and standard error.

Common name	BWCS	MCBU	SCB	TWZ
Spotted gar	0.09	0.00	0.00	0.00
	(0.09)	(0.00)	(0.00)	(0.00)
Longnose gar	0.00	0.00	0.13	0.00
	(0.00)	(0.00)	(0.09)	(0.00)
Shortnose gar	0.09	0.14	0.85	1.32
	(0.09)	(0.09)	(0.40)	(1.16)
Bowfin	0.21	0.00	0.00	0.00
	(0.15)	(0.00)	(0.00)	(0.00)
Skipjack herring	0.00	0.00	0.12	0.00
	(0.00)	(0.00)	(0.09)	(0.00)
Gizzard shad	57.39	22.78	18.32	181.91
	(10.80)	(7.87)	(2.96)	(42.71)
Threadfin shad	11.82	0.69	2.07	15.96
	(8.03)	(0.36)	(0.66)	(13.70)
Goldfish	1.02	0.07	0.08	0.21
	(0.38)	(0.07)	(0.08)	(0.21)
Red shiner	0.00	0.00	0.05	0.00
	(0.00)	(0.00)	(0.05)	(0.00)
Common carp	17.05	13.62	20.45	32.74
	(6.31)	(3.30)	(3.03)	(10.18)
Goldfish x carp	0.10	0.00	0.04	0.00
	(0.10)	(0.00)	(0.04)	(0.00)
Silver chub	4.01	0.27	0.00	0.00
	(3.02)	(0.15)	(0.00)	(0.00)
Golden shiner	0.07	0.00	0.00	0.00
	(0.07)	(0.00)	(0.00)	(0.00)
Emerald shiner	1.86	0.84	1.37	2.82
	(1.18)	(0.46)	(0.32)	(1.55)
Spottail shiner	0.00	0.00	0.03	0.00
	(0.00)	(0.00)	(0.03)	(0.00)
Silverband shiner	0.19	0.00	0.04	0.14
	(0.19)	(0.00)	(0.04)	(0.14)
Sand shiner	0.19	0.00	0.00	0.00
	(0.19)	(0.00)	(0.00)	(0.00)
Bullhead minnow	0.00	0.00	0.06	0.00
	(0.00)	(0.00)	(0.04)	(0.00)
River carpsucker	6.18	1.64	1.26	0.63
	(4.30)	(0.78)	(0.32)	(0.63)
Quillback	0.44	0.00	0.00	0.69
	(0.31)	(0.00)	(0.00)	(0.69)
Highfin carpsucker	1.00	0.00	0.00	0.25
	(1.00)	(0.00)	(0.00)	(0.25)
White sucker	0.00	0.00	0.00	0.33
	(0.00)	(0.00)	(0.00)	(0.22)
Smallmouth buffalo	2.79	1.70	2.02	14.07
	(1.36)	(0.45)	(0.44)	(3.63)
Bigmouth buffalo	0.49	1.08	4.62	8.60
	(0.31)	(0.53)	(0.97)	(2.61)
Black buffalo	0.10	0.00	0.34	0.50
	(0.10)	(0.00)	(0.12)	(0.37)
Silver redhorse	0.09	0.00	0.00	0.00
	(0.09)	(0.00)	(0.00)	(0.00)
Golden redhorse	0.45	0.07	0.03	0.25
	(0.24)	(0.07)	(0.03)	(0.25)
Shorthead redhorse	1.11	0.48	0.07	1.31
	(0.75)	(0.29)	(0.05)	(0.52)
Black bullhead	0.10	0.00	0.03	0.88
	(0.10)	(0.00)	(0.03)	(0.63)
Yellow bullhead	0.09	0.00	0.00	0.00
	(0.09)	(0.00)	(0.00)	(0.00)

Strata: BWCS - Backwater, contiguous, shoreline MCBU - Main channel border, unstructured
BWCO - Backwater, contiguous, offshore MCBW - Main channel border, wing dam
IMPS - Impounded, shoreline SCB - Side channel boarder
IMPO - Impounded, offshore CTR - Main channel trough TWZ - Tilwater

Table 6.3.2. Mean catch-per-unit-effort and (standard error) for fishes collected by using night electrofishing in the La Grange Pool of the Illinois River using fixed-site sampling during 1991. See text for definitions of catch-per-unit-effort and standard error.

Common name	BWCS	MCBU	SCB	TWZ
Brown bullhead	0.00	0.00	0.04	0.13
	(0.00)	(0.00)	(0.04)	(0.13)
Channel catfish	3.14	7.38	1.24	0.00
	(1.48)	(2.14)	(0.40)	(0.00)
Flathead catfish	0.07	0.55	0.69	0.13
	(0.07)	(0.21)	(0.19)	(0.13)
Blackstripe topminnow	0.09	0.00	0.02	0.00
	(0.09)	(0.00)	(0.02)	(0.00)
Western mosquitofish	0.09	0.00	0.10	0.00
	(0.09)	(0.00)	(0.07)	(0.00)
Brook silverside	0.44	0.00	0.61	0.00
	(0.28)	(0.00)	(0.23)	(0.00)
White bass	5.40	5.01	2.53	151.22
	(2.86)	(0.93)	(0.69)	(44.56)
Yellow bass	0.64	0.23	0.00	2.14
	(0.30)	(0.23)	(0.00)	(1.83)
Green sunfish	1.66	0.43	0.90	18.50
	(0.90)	(0.23)	(0.34)	(11.05)
Pumpkinseed	0.00	0.00	0.03	0.83
	(0.00)	(0.00)	(0.03)	(0.83)
Warmouth	0.00	0.00	0.31	0.25
	(0.00)	(0.00)	(0.13)	(0.25)
Bluegill	46.86	13.45	30.45	76.91
	(17.03)	(3.53)	(6.25)	(35.45)
Longear sunfish	0.00	0.00	0.00	0.21
	(0.00)	(0.00)	(0.00)	(0.21)
Green sunfish x bluegill	0.07	0.00	0.08	0.00
	(0.07)	(0.00)	(0.06)	(0.00)
Largemouth bass	10.96	9.57	6.91	9.24
	(3.39)	(2.79)	(1.63)	(2.92)
White crappie	1.28	0.81	2.02	8.83
	(0.64)	(0.27)	(0.56)	(3.32)
Black crappie	3.23	2.12	3.87	9.43
	(1.06)	(0.88)	(0.84)	(3.41)
Logperch	0.25	0.00	0.00	0.35
	(0.19)	(0.00)	(0.00)	(0.23)
Sauger	6.25	0.36	0.22	4.17
	(2.55)	(0.16)	(0.11)	(1.95)
Walleye	0.00	0.07	0.00	0.28
	(0.00)	(0.07)	(0.00)	(0.28)
Freshwater drum	37.33	25.30	13.69	5.39
	(15.48)	(5.54)	(2.93)	(2.98)

Strata: BWCS - Backwater, contiguous, shoreline
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MCBU - Main channel border, unstructured
MCBW - Main channel border, wing dam
SCB - Side channel boarder
CTR - Main channel trough
TWZ - Tailwater

Table 6.3.3. Mean catch-per-unit-effort and (standard error) for fishes collected by using fyke netting in the La Grange Pool of the Illinois River using fixed-site sampling during 1991. See text for definitions of catch-per-unit-effort and standard error.

Common name	BWCS	TWZ
Spotted gar	0.78	0.18
	(0.31)	(0.18)
Longnose gar	0.41	0.35
	(0.17)	(0.22)
Shortnose gar	11.77	5.46
	(3.07)	(2.19)
Bowfin	0.73	0.34
	(0.39)	(0.21)
American eel	0.05	0.00
	(0.05)	(0.00)
Skipjack herring	0.35	2.44
	(0.15)	(1.13)
Gizzard shad	69.78	45.80
	(20.48)	(22.49)
Threadfin shad	188.26	8.10
	(66.49)	(5.14)
Goldfish	0.11	0.00
	(0.07)	(0.00)
Common carp	14.56	3.21
	(8.43)	(0.72)
Golden shiner	0.10	0.00
	(0.07)	(0.00)
Emerald shiner	0.00	0.17
	(0.00)	(0.17)
River carpsucker	2.35	1.68
	(1.03)	(0.87)
Quillback	0.57	0.34
	(0.23)	(0.21)
Highfin carpsucker	0.26	0.00
	(0.13)	(0.00)
White sucker	0.05	0.51
	(0.05)	(0.23)
Smallmouth buffalo	1.79	3.80
	(0.45)	(1.67)
Bigmouth buffalo	0.78	3.48
	(0.39)	(1.48)
Black buffalo	0.05	0.17
	(0.05)	(0.17)
Silver redhorse	0.06	0.00
	(0.06)	(0.00)
Golden redhorse	0.15	0.00
	(0.08)	(0.00)
Shorthead redhorse	2.54	2.77
	(1.67)	(1.29)
Black bullhead	0.90	5.93
	(0.34)	(2.24)
Yellow bullhead	1.88	0.00
	(0.46)	(0.0)
Brown bullhead	2.11	1.03
	(0.57)	(0.46)
Channel catfish	0.41	5.03
	(0.16)	(2.71)
Flathead catfish	0.11	0.51
	(0.07)	(0.35)
Northern pike	0.06	0.00
	(0.06)	(0.00)
White bass	22.27	25.24
	(4.07)	(4.88)
Yellow bass	2.00	0.34
	(0.76)	(0.21)

Strata: BWCS - Backwater, contiguous, shoreline
BWCO - Backwater, contiguous, offshore
IMPS - Impounded, shoreline
IMPO - Impounded, offshore
MCBU - Main channel border, unstructured
MCBW - Main channel border, wing dam
SCB - Side channel boarder
CTR - Main channel trough
TWZ - Tailwater

Table 6.3.3. Mean catch-per-unit-effort and (standard error) for fishes collected by using fyke netting in the La Grange Pool of the Illinois River using fixed-site sampling during 1991. See text for definitions of catch-per-unit-effort and standard error.

Common name	BWCS	TWZ
Green sunfish	0.95	10.08
	(0.29)	(3.99)
Pumpkinseed	0.10	2.24
	(0.10)	(1.10)
Warmouth	0.16	0.00
	(0.11)	(0.00)
Orangespotted sunfish	0.00	0.51
	(0.00)	(0.51)
Bluegill	104.48	418.65
	(27.66)	(139.85)
Redear sunfish	0.06	0.00
	(0.06)	(0.00)
Green sunfish x bluegill	0.11	0.00
	(0.07)	(0.00)
Largemouth bass	4.51	3.06
	(1.36)	(0.69)
White crappie	15.23	77.18
	(3.91)	(35.25)
Black crappie	68.98	168.80
	(14.22)	(82.86)
Sauger	0.82	1.85
	(0.42)	(0.79)
Walleye	0.10	0.17
	(0.07)	(0.17)
Freshwater drum	15.93	11.11
	(5.24)	(6.16)

Strata: BWCS - Backwater, contiguous, shoreline
BWCO - Backwater, contiguous, offshore
IMPS - Impounded, shoreline
IMPO - Impounded, offshore
MCBU - Main channel border, unstructured
MCBW - Main channel border, wing dam
SCB - Side channel boarder
CTR - Main channel trough
TWZ - Tailwater

Table 6.3.4. Mean catch-per-unit-effort and (standard error) for fishes collected by using mini fyke netting in the La Grange Pool of the Illinois River using fixed-site sampling during 1991. See text for definitions of catch-per-unit-effort and standard error.

Common name	BWCS	TWZ
Shortnose gar	0.62	0.00
	(0.62)	(0.00)
Skipjack herring	208.95	0.34
	(208.95)	(0.21)
Gizzard shad	219.42	24.15
	(219.00)	(20.49)
Threadfin shad	3848.77	3.99
	(3848.77)	(3.79)
Silver chub	0.00	0.34
	(0.00)	(0.34)
Emerald shiner	0.00	1.27
	(0.00)	(1.27)
Spottail shiner	0.00	4.85
	(0.00)	(4.85)
Silverband shiner	2.47	2.10
	(2.47)	(2.10)
Bullhead minnow	0.62	0.00
	(0.62)	(0.00)
River carpsucker	0.31	0.00
	(0.31)	(0.00)
Black bullhead	0.00	0.99
	(0.00)	(0.67)
Yellow bullhead	0.00	0.16
	(0.00)	(0.16)
Channel catfish	0.00	0.32
	(0.00)	(0.32)
Flathead catfish	0.00	0.17
	(0.00)	(0.17)
White bass	0.00	0.51
	(0.00)	(0.23)
Yellow bass	0.00	0.16
	(0.00)	(0.16)
Green sunfish	0.00	12.80
	(0.00)	(5.27)
Pumpkinseed	0.00	0.80
	(0.00)	(0.52)
Bluegill	70.99	5.68
	(70.99)	(2.50)
Largemouth bass	0.00	0.49
	(0.00)	(0.22)
White crappie	0.00	3.66
	(0.00)	(1.73)
Black crappie	1.23	2.46
	(1.23)	(1.54)
Logperch	0.62	0.00
	(0.62)	(0.00)
Freshwater drum	0.93	0.65
	(0.93)	(0.48)

Strata: BWCS - Backwater, contiguous, shoreline
BWCO - Backwater, contiguous, offshore
IMPS - Impounded, shoreline
IMPO - Impounded, offshore
MCBU - Main channel border, unstructured
MCBW - Main channel border, wing dam
SCB - Side channel boarder
CTR - Main channel trough
TWZ - Tailwater

Table 6.3.5. Mean catch-per-unit-effort and (standard error) for fishes collected by using tandem hoop netting in the La Grange Pool of the Illinois River using fixed-site sampling during 1991. See text for definitions of catch-per-unit-effort and standard error.

Common name	MCBU	SCB	TWZ
Skipjack herring	0.00	0.02	0.00
	(0.00)	(0.02)	(0.00)
Gizzard shad	0.04	0.25	0.08
	(0.04)	(0.12)	(0.08)
Common carp	59.48	29.66	86.27
	(12.41)	(3.62)	(19.88)
Goldfish x carp	0.04	0.00	0.09
	(0.04)	(0.00)	(0.09)
River carpsucker	0.08	0.19	1.43
	(0.05)	(0.09)	(1.33)
Quillback	0.00	0.00	0.42
	(0.00)	(0.00)	(0.27)
Highfin carpsucker	0.00	0.02	0.00
	(0.00)	(0.02)	(0.00)
Smallmouth buffalo	0.69	1.77	1.19
	(0.25)	(0.84)	(0.82)
Bigmouth buffalo	0.00	0.04	0.08
	(0.00)	(0.04)	(0.08)
Black buffalo	0.00	0.10	0.09
	(0.00)	(0.06)	(0.09)
Shorthead redhorse	0.00	0.15	0.42
	(0.00)	(0.06)	(0.20)
Black bullhead	0.04	0.06	0.42
	(0.04)	(0.03)	(0.15)
Yellow bullhead	0.13	0.00	0.00
	(0.09)	(0.00)	(0.00)
Brown bullhead	0.25	0.08	0.00
	(0.14)	(0.05)	(0.00)
Blue catfish	0.00	0.02	0.00
	(0.00)	(0.02)	(0.00)
Channel catfish	35.84	58.27	8.71
	(11.20)	(28.92)	(2.45)
Stonecat	0.00	0.02	0.00
	(0.00)	(0.02)	(0.00)
Flathead catfish	0.58	0.22	0.08
	(0.22)	(0.08)	(0.08)
White bass	0.00	0.00	3.78
	(0.00)	(0.00)	(3.68)
White crappie	0.00	0.08	0.00
	(0.00)	(0.06)	(0.00)
Black crappie	0.00	0.20	0.08
	(0.00)	(0.10)	(0.08)
Sauger	0.00	0.00	0.09
	(0.00)	(0.00)	(0.09)
Freshwater drum	2.69	1.76	0.75
	(0.43)	(0.28)	(0.42)

Strata: BWCS - Backwater, contiguous, shoreline
BWCO - Backwater, contiguous, offshore
IMPS - Impounded, shoreline
IMPO - Impounded, offshore
MCBU - Main channel border, unstructured
MCBW - Main channel border, wing dam
SCB - Side channel boarder
CTR - Main channel trough
TWZ - Tailwater

Table 6.3.6. Mean catch-per-unit-effort and (standard error) for fishes collected by using seining in the La Grange Pool of the Illinois River using fixed-site sampling during 1991. See text for definitions of catch-per-unit-effort and standard error.

Common name	BWCS	MCBU	SCB
Longnose gar	0.00	0.00	0.04
	(0.00)	(0.00)	(0.04)
Shortnose gar	0.00	0.00	0.08
	(0.00)	(0.00)	(0.06)
Skipjack herring	0.58	13.17	1.58
	(0.58)	(10.90)	(1.15)
Gizzard shad	10.67	24.58	18.17
	(4.10)	(5.40)	(5.51)
Threadfin shad	2.75	31.92	122.71
	(1.69)	(13.42)	(103.12)
Red shiner	1.17	0.00	1.25
	(1.08)	(0.00)	(0.82)
Common carp	0.67	0.33	0.08
	(0.36)	(0.19)	(0.06)
Silver chub	0.00	1.17	3.67
	(0.00)	(0.82)	(1.83)
Golden shiner	0.00	0.00	0.04
	(0.00)	(0.00)	(0.04)
Emerald shiner	8.33	18.00	7.00
	(4.17	(10.24)	(2.54)
Silverband shiner	0.33	0.00	0.13
	(0.33)	(0.00)	(0.09)
Suckermouth minnow	0.50	0.00	0.00
	(0.36)	(0.00)	(0.00)
Bullhead minnow	3.42	0.00	1.04
	(1.64)	(0.00)	(0.55)
River carpsucker	0.42	0.00	0.33
	(0.29)	(0.00)	(0.16)
Smallmouth buffalo	0.17	0.08	0.08
	(0.17)	(0.08)	(0.06)
Black buffalo	0.00	0.08	0.00
	(0.00)	(0.08)	(0.00)
Black bullhead	0.00	0.00	0.04
	(0.00)	(0.00)	(0.04)
Channel catfish	0.25	0.58	0.29
	(0.18)	(0.19)	(0.13)
Blackstripe topminnow	1.33	0.00	0.25
	(0.84)	(0.00)	(0.11)
Western mosquitofish	0.83	0.17	1.00
	(0.83)	(0.17)	(0.60)
Brook silverside	1.00	0.00	0.38
	(0.65)	(0.00)	(0.22)
White bass	0.58	2.42	2.00
	(0.34)	(1.31)	(0.89)
Yellow bass	0.00	0.00	0.04
	(0.00)	(0.00)	(0.04)
Green sunfish	0.08	0.00	0.04
	(0.08)	(0.00)	(0.04)
Warmouth	0.08	0.00	0.00
	(0.08)	(0.00)	(0.00)
Orangespotted sunfish	0.08	0.00	0.00
	(0.08)	(0.00)	(0.00)
Bluegill	5.75	6.00	6.58
	(2.00)	(3.86)	(2.26)
Largemouth bass	0.50	0.08	0.38
	(0.19)	(0.08)	(0.22)
White crappie	0.17	0.00	0.08
	(0.17)	(0.00)	(0.06)
Black crappie	1.83	0.00	0.21
	(1.31)	(0.00)	(0.12)

Strata: BWCS - Backwater, contiguous, shoreline MCBU - Main channel border, unstructured
BWCO - Backwater, contiguous, offshore MCBW - Main channel border, wing dam
IMPS - Impounded, shoreline SCB - Side channel boarder
IMPO - Impounded, offshore CTR - Main channel trough TWZ - Tailwater

Table 6.3.6. Mean catch-per-unit-effort and (standard error) for fishes collected by using seining in the La Grange Pool of the Illinois River using fixed-site sampling during 1991. See text for definitions of catch-per-unit-effort and standard error.

Common name	BWCS	MCBU	SCB
Johnny darter	0.42	0.00	0.00
	(0.42)	(0.00)	(0.00)
Logperch	0.00	0.17	0.00
	(0.00)	(0.11)	(0.00)
Sauger	0.17	0.00	0.00
	(0.17)	(0.00)	(0.00)
Freshwater drum	2.00	4.83	12.96
	(0.83)	(2.73)	(6.59)

Strata: BWCS - Backwater, contiguous, shoreline
BWCO - Backwater, contiguous, offshore
IMPS - Impounded, shoreline
IMPO - Impounded, offshore
MCBU - Main channel border, unstructured
MCBW - Main channel border, wing dam
SCB - Side channel boarder
CTR - Main channel trough
TWZ - Tailwater

Table 6.3.7. Mean catch-per-unit-effort and (standard error) for fishes collected by using bottom trawling in the La Grange Pool of the Illinois River using fixed-site sampling during 1991. See text for definitions of catch-per-unit-effort and standard error.

Common name	MCBU	TWZ
Gizzard shad	0.00	0.17
	(0.00)	(0.17)
Threadfin shad	0.00	0.11
	(0.00)	(0.11)
Common carp	0.63	0.83
	(0.20)	(0.78)
Silver chub	0.04	0.00
	(0.04)	(0.00)
Silverband shiner	0.00	0.06
	(0.00)	(0.06)
River carpsucker	0.04	0.06
	(0.04)	(0.06)
Shorthead redhorse	0.04	0.00
	(0.04)	(0.00)
Black bullhead	0.00	0.00
	(0.00)	(0.00)
Brown bullhead	0.04	0.00
	(0.04)	(0.00)
Channel catfish	1.46	5.50
	(0.33)	(2.37)
Stonecat	0.00	0.00
	(0.00)	(0.00)
Flathead catfish	0.04	0.06
	(0.04)	(0.06)
Bluegill	0.04	0.06
	(0.04)	(0.06)
White crappie	0.00	0.00
	(0.00)	(0.00)
Sauger	0.00	0.06
	(0.00)	(0.06)
Freshwater drum	6.50	16.67
	(2.08)	(10.01)

Strata: BWCS - Backwater, contiguous, shoreline
BWCO - Backwater, contiguous, offshore
IMPS - Impounded, shoreline
IMPO - Impounded, offshore
MCBU - Main channel border, unstructured
MCBW - Main channel border, wing dam
SCB - Side channel boarder
CTR - Main channel trough
TWZ - Tailwater

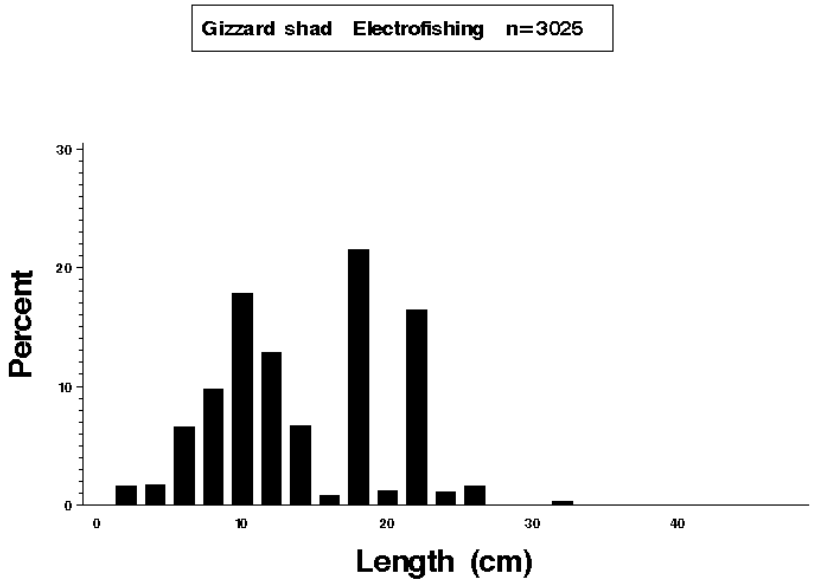

Figure 6.2. Length distributions (*length*) as a percentage of catch (*percent*) for gizzard shad (*Dorosoma cepedianum*) collected by electrofishing in the Illinois River, La Grange Pool during 1991.

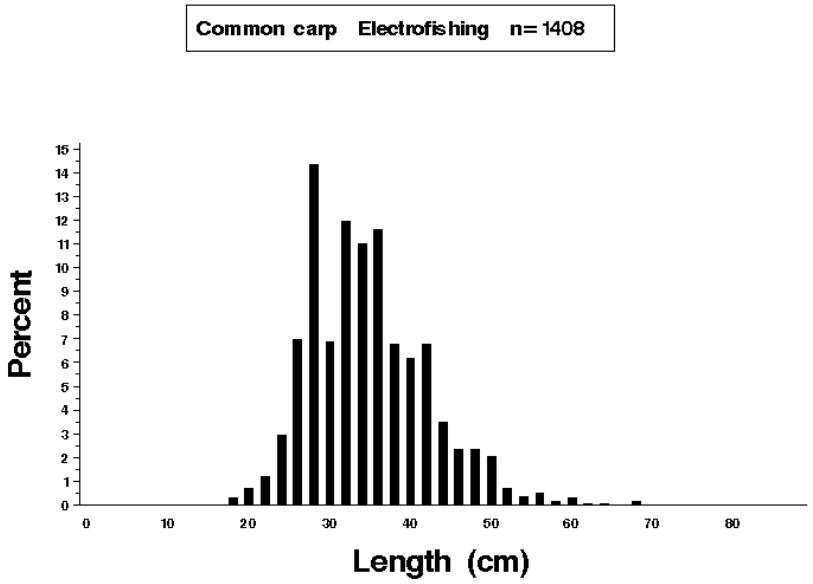

Figure 6.3. Length distributions (*length*) as a percentage of catch (*percent*) for common carp (*Cyprinus carpio*) collected by electrofishing in the Illinois River, La Grange Pool during 1991.

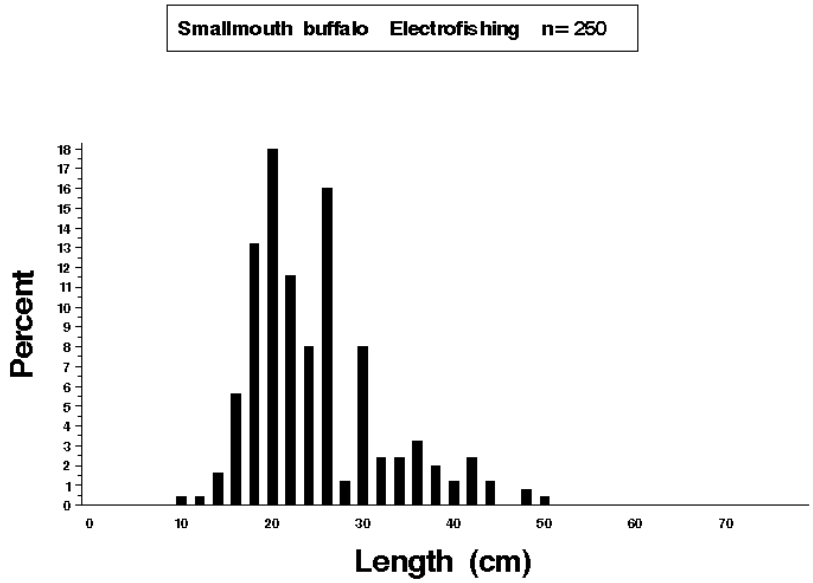

Figure 6.4. Length distributions (*length*) as a percentage of catch (*percent*) for smallmouth buffalo (*Ictiobus bubalus*) collected by electrofishing in the Illinois River, La Grange Pool during 1991.

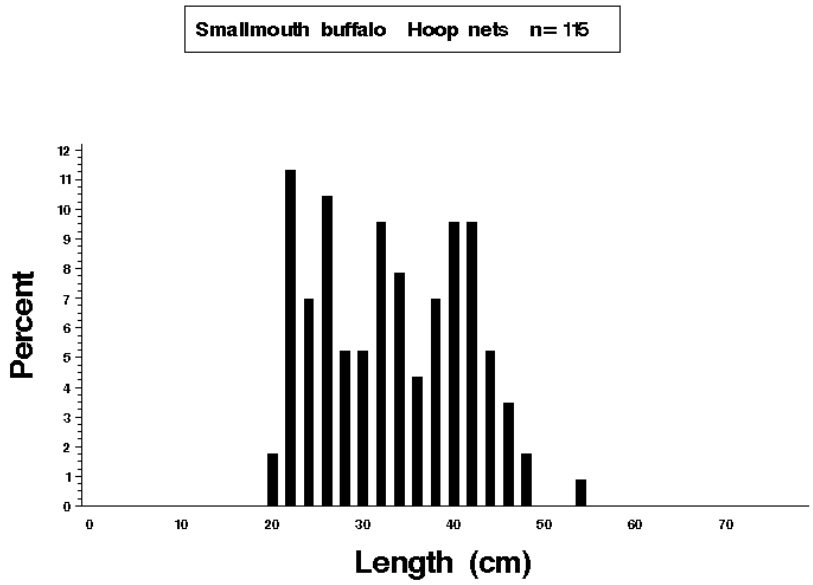

Figure 6.5. Length distributions (*length*) as a percentage of catch (*percent*) for smallmouth buffalo (*Ictiobus bubalus*) collected by large and small hoop netting in the Illinois River, La Grange Pool during 1991.

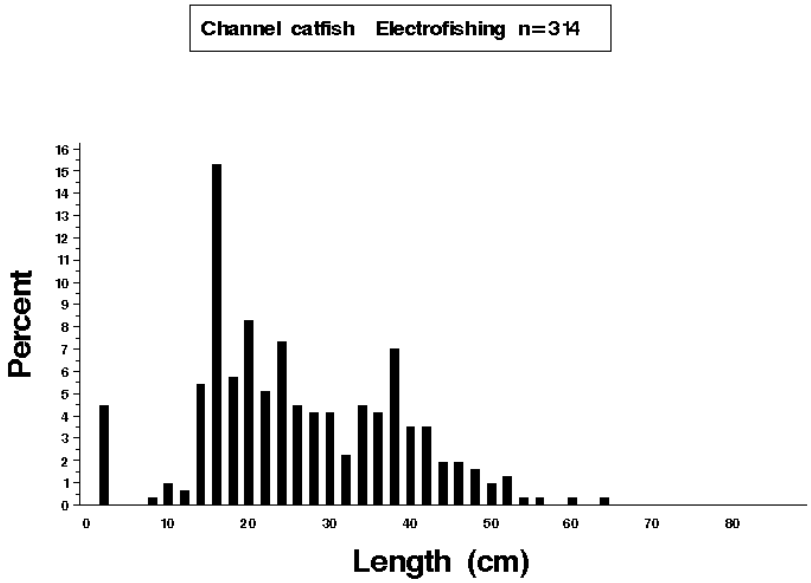

Figure 6.6. Length distributions (*length*) as a percentage of catch (*percent*) for channel catfish (*Ictalurus punctatus*) collected by electrofishing in the Illinois River, La Grange Pool during 1991.

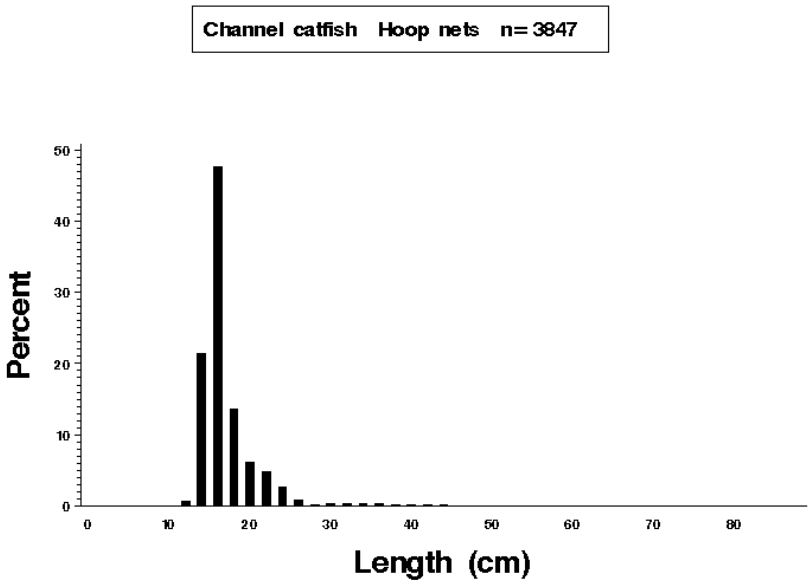

Figure 6.7. Length distributions (*length*) as a percentage of catch (*percent*) for channel catfish (*Ictalurus punctatus*) collected by large and small hoop netting in the Illinois River, La Grange Pool during 1991.

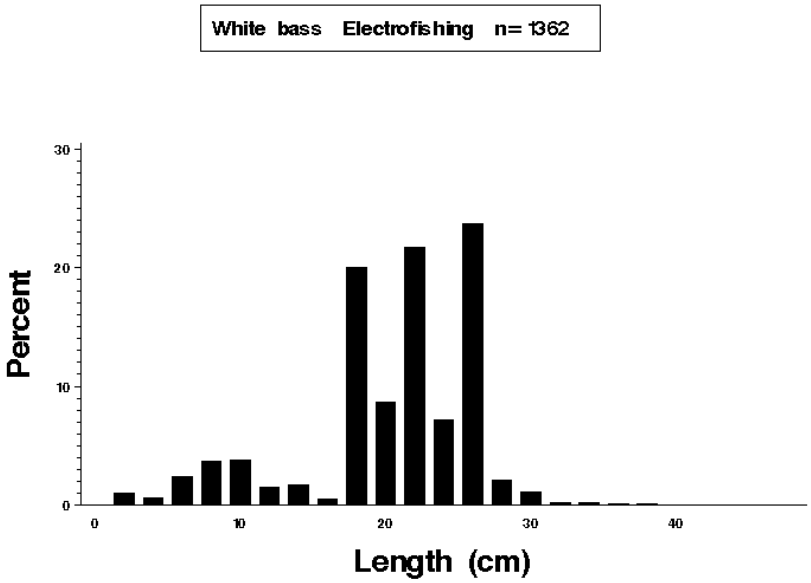

Figure 6.8. Length distributions (*length*) as a percentage of catch (*percent*) for white bass (*Morone chryops*) collected by electrofishing in the Illinois River, La Grange Pool during 1991.

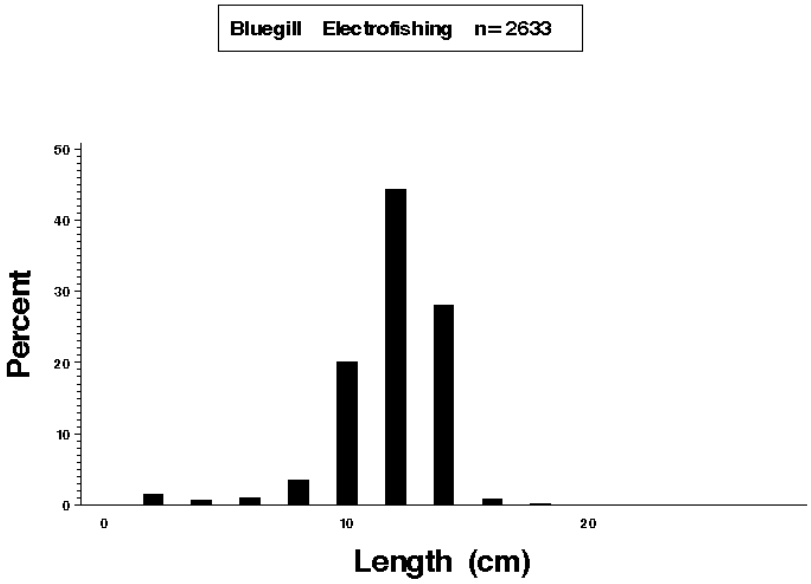

Figure 6.9. Length distributions (*length*) as a percentage of catch (*percent*) for bluegill (*Lepomis macrochirus*) collected by electrofishing in the Illinois River, La Grange Pool during 1991.

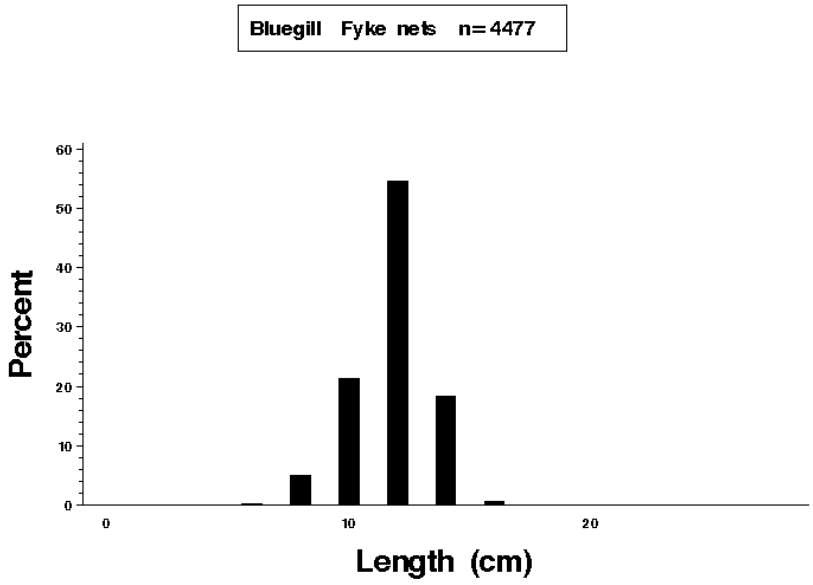

Figure 6.10. Length distributions (*length*) as a percentage of catch (*percent*) for bluegill (*Lepomis macrochirus*) collected by fyke netting in the Illinois River, La Grange Pool during 1991.

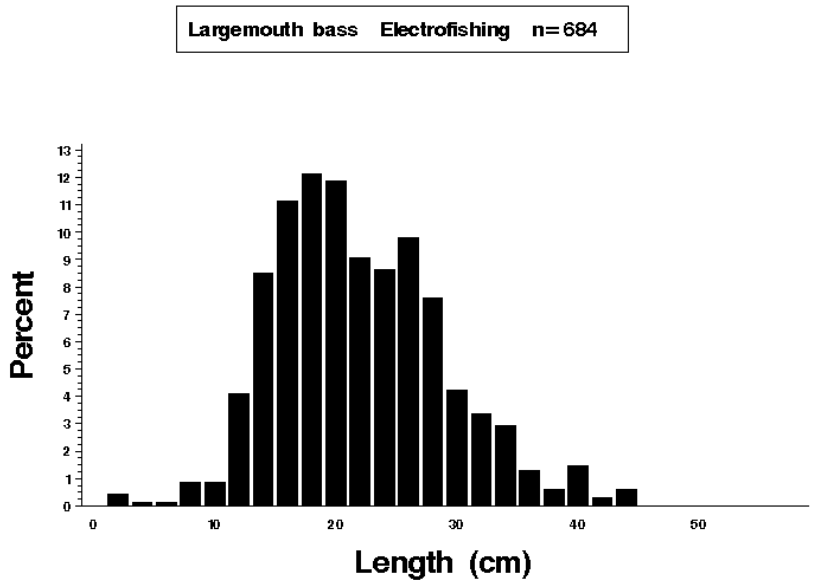

Figure 6.11. Length distributions (*length*) as a percentage of catch (*percent*) for largemouth bass (*Micropterus salmoides*) collected by electrofishing in the Illinois River, La Grange Pool during 1991.

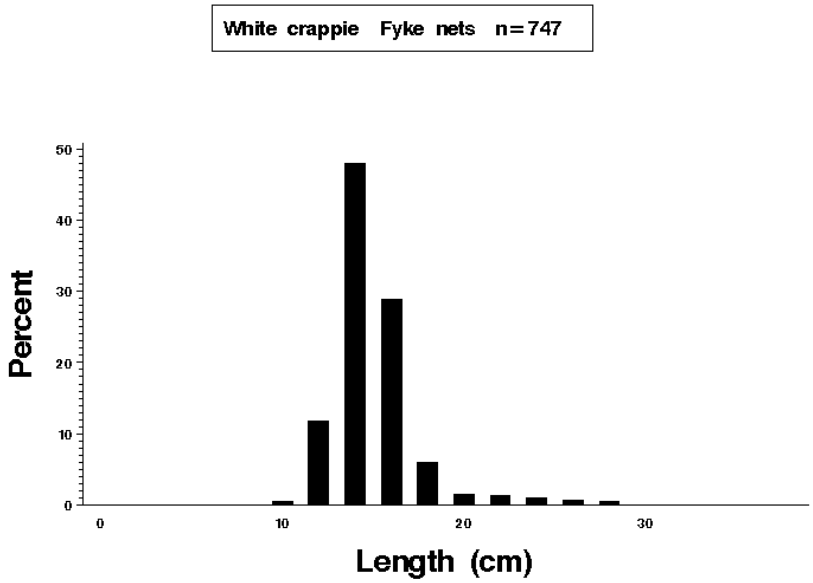

Figure 6.12. Length distributions (*length*) as a percentage of catch (*percent*) for white crappie (*Pomoxis annularus*) collected by fyke netting in the Illinois River, La Grange Pool during 1991.

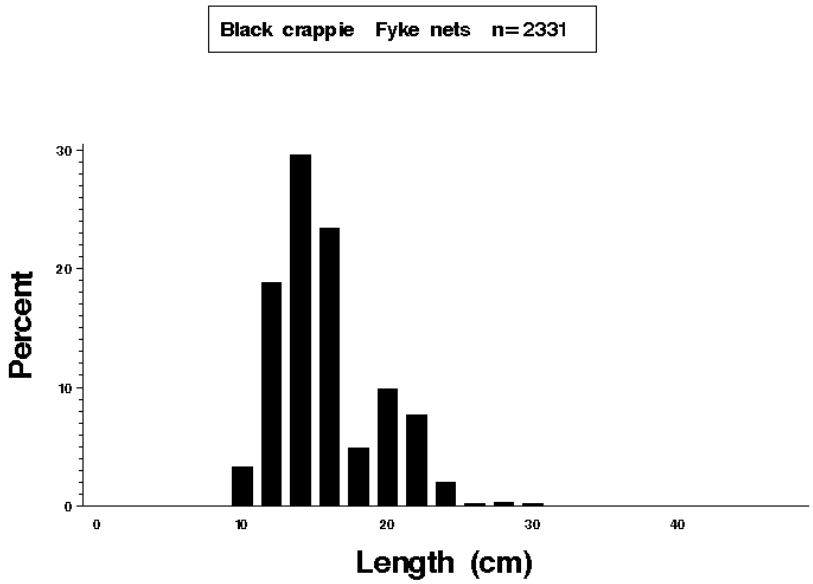

Figure 6.13. Length distributions (*length*) as a percentage of catch (*percent*) for black crappie (*Pomoxis nigromaculatus*) collected by fyke netting in the Illinois River, La Grange Pool during 1991.

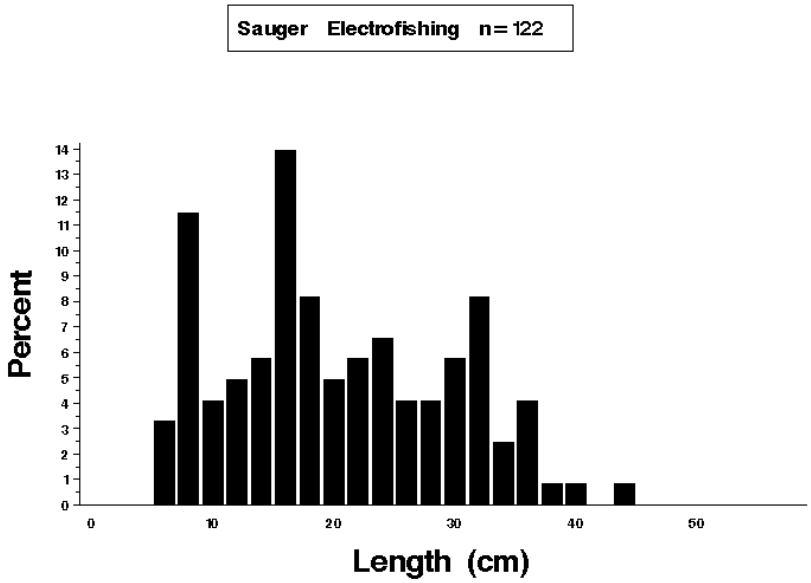

Figure 6.14. Length distributions (*length*) as a percentage of catch (*percent*) for sauger (*Stizostedion canadense*) collected by electrofishing in the Illinois River, La Grange Pool during 1991.

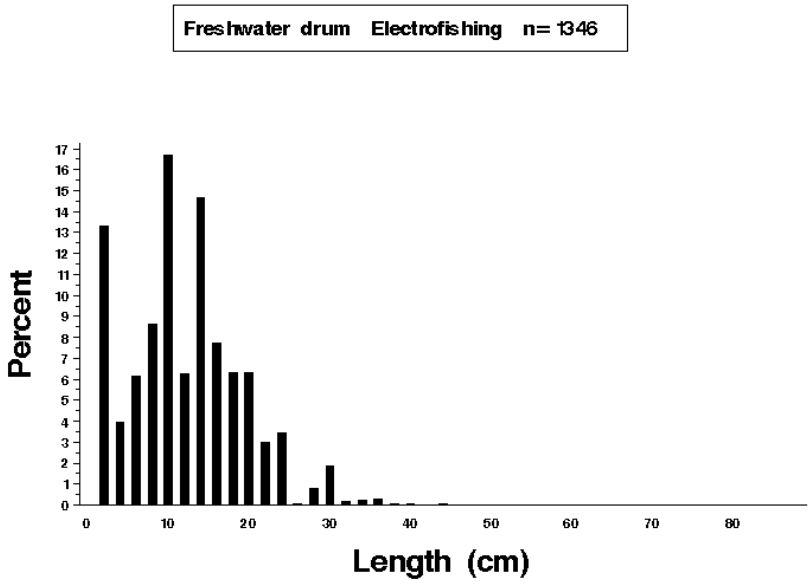

Figure 6.15. Length distributions (*length*) as a percentage of catch (*percent*) for freshwater drum (*Aplodinotus grunniens*) collected by electrofishing in the Illinois River, La Grange Pool during 1991.

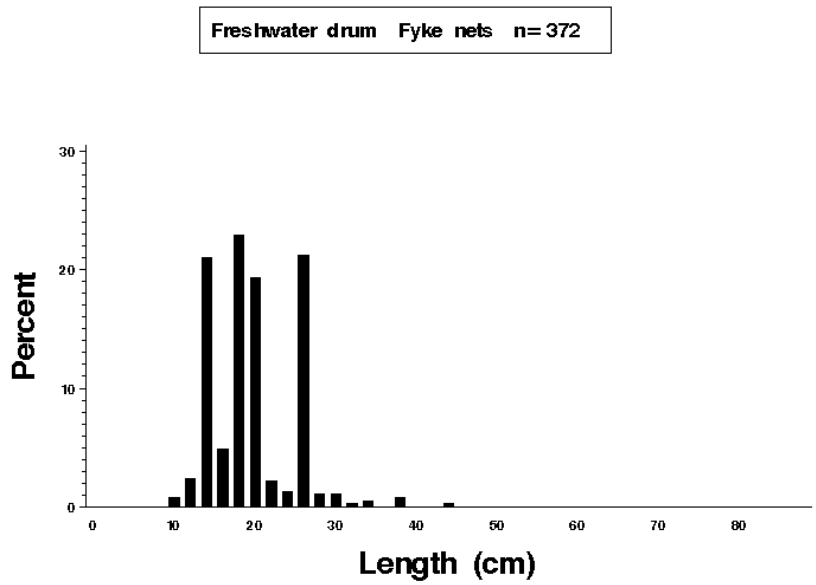

Figure 6.16. Length distributions (*length*) as a percentage of catch (*percent*) for freshwater drum (*Aplodinotus grunniens*) collected by fyke netting in the Illinois River, La Grange Pool during 1991.

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13. ABSTRACT (Maximum 200 words) The Long Term Resource Monitoring Program (LTRMP) completed 2,653 collections of fishes from stratified random and permanently fixed sampling locations in six study reaches of the Upper Mississippi River System during 1991. Collection methods included day and night electrofishing, hoop netting, fyke netting (two net sizes), gill netting, seining, and trawling in select aquatic area classes. The six LTRMP study reaches are Pools 4 (excluding Lake Pepin), 8, 13, and 26 of the Upper Mississippi River, an unimpounded reach of the Mississippi River near Cape Girardeau, Missouri and the La Grange Pool of the Illinois River. A total of 61–79 fish species were detected in each study reach. For each of the six LTRMP study reaches, this report contains summaries of: (1) sampling efforts in each combination of gear type and aquatic area class, (2) total catches of each species from each gear type, (3) mean catch-per-unit of gear effort statistics and standard errors for common species from each combination of aquatic area class and selected gear type, and (4) length distributions of common species from selected gear types.		
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The Long Term Resource Monitoring Program (LTRMP) for the Upper Mississippi River System was authorized under the Water Resources Development Act of 1986 as an element of the Environmental Management Program. The mission of the LTRMP is to provide river managers with information for maintaining the Upper Mississippi River System as a sustainable large river ecosystem given its multiple-use character. The LTRMP is a cooperative effort by the U.S. Geological Survey, the U.S. Army Corps of Engineers, and the States of Illinois, Iowa, Minnesota, Missouri, and Wisconsin.