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## Fishes of the Red River in Arkansas

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### Abstract

Fishes were collected from Red River mainstem habitats in Arkansas with seines, rotenone, hoop nets, gill nets, and trotlines from 1995 through 2001. Seventy-two species were identified distributed among 17 families, and 15 species were new records for the Red River in Arkansas. Eighty-three species are now historically known from the Arkansas segment of the Red River. Approximately 67% of the fishes known from the entire Red River have been found in the Arkansas segment, which is only 11% of the entire river length. Baseline data on the fish fauna of the Red River is critical for the analysis of potential effects to aquatic systems, and because of the potential for deleterious effects from alteration of aquatic habitats by a proposed project to extend the Red River Navigation System upstream from Shreveport, Louisiana to Index, Arkansas and by desalination projects upstream in Texas.

### Introduction

The fish communities of large rivers are the least studied ichthyofaunas of all aquatic habitats in Arkansas. This study was the first comprehensive sampling to determine fish species distribution and abundance within the entire Arkansas segment of the Red River. An up-to-date survey of the fishes of the Red River in Arkansas is especially important because of the proposed construction of a navigation channel from Shreveport, Louisiana through the lower half of the Red River in Arkansas.

**Description of the Red River and the Study Area in Arkansas.**--The Red River originates in eastern New Mexico and flows easterly across the Texas panhandle, along the boundary between Texas and Oklahoma, through the southwestern corner of Arkansas, and across Louisiana to join the Atchafalaya River near Simmesport, Louisiana. The Red River formerly flowed directly into the Mississippi River, but the flood of 1927 and the subsequent construction of levees diverted the Red River southward into the Atchafalaya River (Douglas, 1974). Today, the Red River is accessible from the Mississippi River through its old channel because part of the Mississippi River flow is diverted through the old channel (11.3 km) into the Atchafalaya River, forming the first segment of the Red River Navigation System.

The Red River is 1,945 km long and drains an area of 179,308 km<sup>2</sup>. The Arkansas segment of the river is 217 km long with a drainage area of 11,484 km<sup>2</sup>. Compared to the other big rivers in Arkansas (e.g., the Arkansas and Mississippi Rivers), the Red River has been least altered by human activity. A number of anthropogenic alterations, however, have occurred in the Red River upstream and downstream from Arkansas. The upper Red River in Texas and Oklahoma contains salt concentrations approaching

that of seawater with decreasing salinities occurring downstream (Matthews, 1998). The Echelle et al. (1972) fish surveys indicated that the species composition of the upper Red River reflected differences in the fish assemblages along the salinity gradient. Those assemblages are currently threatened to be influenced by a project underway to decrease the amount of salt in the Red River by building dams, brine reservoirs, pipelines and pumps on west Texas tributaries that feed the Red River. The natural flow regime has been changed by the construction of Denison Dam, which impounded Lake Texoma on the Red River in Oklahoma, by seven large impoundments in the Little River drainage in Arkansas and Oklahoma, and by several other small impoundments on Red River tributaries in Oklahoma. The lower portion of the Red River in Arkansas downstream from the U.S. Hwy 71 bridge has been modified by manmade levees and numerous areas of revetted banks and wing dikes. Upstream from U.S. Hwy 71 in Arkansas, however, few channel modification structures exist. Downstream from Arkansas, a series of locks and dams maintains a 2.7 m deep navigation channel from the Mississippi River through Old River and the Red River to Shreveport, Louisiana, a distance of approximately 377 km.

**Chronological History of Red River Fish Sampling in Arkansas.**--The earliest reported scientific collection of fishes from the Arkansas portion of the Red River was by Jordan and Gilbert (1886). During September 1884, David Starr Jordan assisted by Charles H. Gilbert, Joseph Swain, and Seth E. Meek collected fishes "with a fine-meshed seine of large size" from a number of streams in Arkansas, Indian Territory (Oklahoma), and Texas for the U. S. National Museum and the U.S. Fish Commission. The Red River at Fulton, Arkansas was one of their collecting sites. They judged the water to be at its lowest point and referred to the Red River at this site as "singularly barren of fish life"

## Fishes of the Red River in Arkansas

although they collected 23 species. *Hybognathus nuchalis* was listed as "by far more numerous in individuals than any other species in the river." *Notropis atherinoides*, *Macrhybopsis hyostoma*, and *M. storeriana* were also reported to be rather common or abundant. All 23 species reported by Jordan and Gilbert (1886) were collected from the Red River in the 1990s.

The next reported collections of fishes from the Arkansas segment of the Red River were in 1938 and 1939 by John D. Black (1940), 54 years after Jordan's expedition. Black collected fishes at three mainstem sites and reported 34 currently recognized fish species from those localities, 18 of which had not been reported from the Red River mainstem by Jordan and Gilbert (1886). This increased the number of species known from the Red River in Arkansas to 41. Black's collections included the first known records of

the Red River shiner, *Notropis bairdi*, from Arkansas (two adult specimens taken at Spring Bank Ferry, 8 km north of the Louisiana state line on 8 July 1939). Black also reported the only specimens of the plains minnow, *Hybognathus placitus*, ever taken from the Red River in Arkansas (three young and adult specimens collected at Spring Bank Ferry on 8 July 1939).

On 18 August 1940, Reeve M. Bailey and M. E. Davis collected 15 species of fishes from the Red River at Fulton. The results of this collection were not published, but the specimens were deposited in the University of Michigan Museum of Zoology. This collection added three species to the list of fishes known from the Red River in Arkansas, bringing the total known species to 44. The most noteworthy record from this sample was the second (and last known) report of *Notropis bairdi* from Arkansas (three

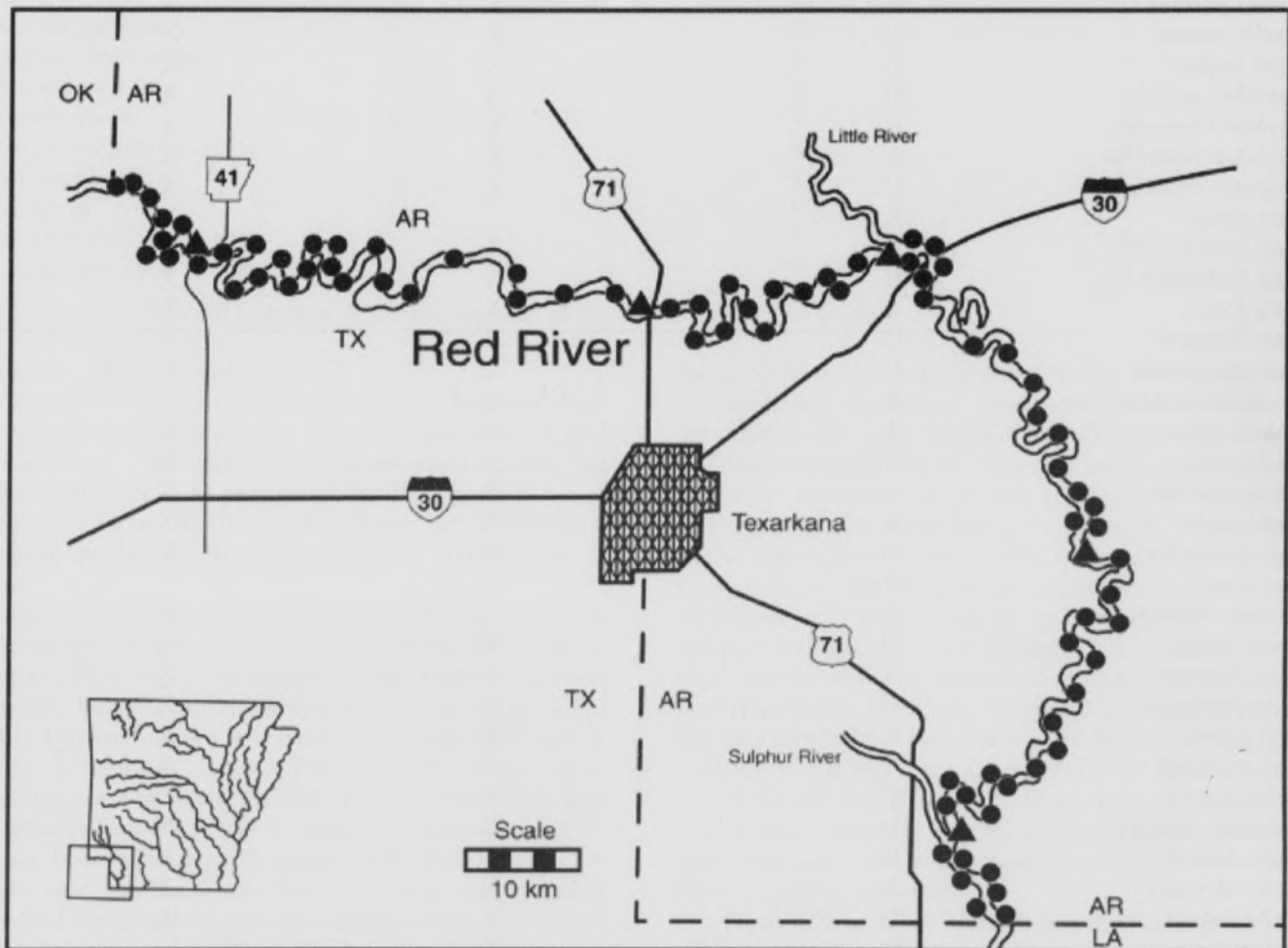


Fig. 1. Red River fish collecting sites in Arkansas, 1995-2001. Solid circles are localities sampled by seine and/or rotenone, solid triangles are localities sampled by hoop nets, gill nets, and/or trotlines. Collecting locales included the following counties in AR: Hempstead, Lafayette, Little River, and Miller.

## Thomas M. Buchanan, Drew Wilson, L. G. Claybrook and William G. Layher

Table 1. Fish species collected from the Red River in Arkansas, 1995-2001. Status of each species is designated as abundant (A), common (C), uncommon (U), or rare (R).

Species	Status	Collected upstream from Little R. mouth	Collected downstream from Little R. mouth
<i>Scaphirhynchus platyrhynchus</i>	C	X	X
<i>Polyodon spathula</i>	R		X
<i>Atractosteus spatula</i>	R	X	X
<i>Lepisosteus oculatus</i>	U	X	X
<i>Lepisosteus osseus</i>	A	X	X
<i>Lepisosteus platostomus</i>	U	X	X
<i>Hiodon alosoides</i>	R	X	
<i>Alosa chrysochloris</i>	U	X	X
<i>Dorosoma cepedianum</i>	C	X	X
<i>Dorosoma petenense</i>	A	X	X
<i>Ctenopharyngodon idella</i> *	R		X
<i>Cyprinella lutrensis</i>	A	X	X
<i>Cyprinella venusta</i>	U	X	X
<i>Cyprinus carpio</i>	U	X	X
<i>Hybognathus nuchalis</i>	U	X	X
<i>Macrhybopsis hyostoma</i>	U	X	X
<i>Macrhybopsis storeriana</i>	A	X	X
<i>Notemigonus crysoleucas</i>	U	X	X
<i>Notropis amnis</i> *	R		X
<i>Notropis atherinoides</i>	A	X	X
<i>Notropis buchanani</i>	U	X	X
<i>Notropis potteri</i>	A	X	X
<i>Notropis shumardi</i>	C	X	X
<i>Opsopoeodus emiliae</i>	U	X	X
<i>Phenacobius mirabilis</i> *	R	X	
<i>Pimephales vigilax</i>	A	X	X
<i>Carpionodes carpio</i>	A	X	X
<i>Cycleptus elongatus</i>	A	X	X
<i>Ictiobus bubalus</i>	C	X	X
<i>Ictiobus cyprinellus</i>	U	X	X
<i>Ictiobus niger</i> *	R	X	
<i>Minytrema melanops</i>	R		X
<i>Ameiurus natalis</i> *	U	X	X
<i>Ictalurus furcatus</i>	A	X	X
<i>Ictalurus punctatus</i>	C	X	X
<i>Noturus gyrinus</i>	U	X	X
<i>Noturus nocturnus</i> *	U	X	X
<i>Pylodictis olivaris</i>	C	X	X
<i>Aphredoderus sayanus</i>	U	X	X
<i>Fundulus blairae</i> *	R		X
<i>Fundulus chrysotus</i>	R	X	X
<i>Fundulus notatus</i>	U	X	X
<i>Fundulus olivaceus</i>	R	X	
<i>Gambusia affinis</i>	C	X	X
<i>Labidesthes sicculus</i> *	U	X	X
<i>Menidia beryllina</i>	A	X	X



## Fishes of the Red River in Arkansas

Table 1. Continued

<i>Morone chrysops</i>	A	X	X
<i>Morone mississippiensis</i>	C	X	X
<i>Morone saxatilis</i>	C	X	X
<i>Elassoma zonatum</i>	U	X	X
<i>Lepomis cyanellus</i>	U	X	X
<i>Lepomis gulosus</i>	C	X	X
<i>Lepomis humilis</i>	C	X	X
<i>Lepomis macrochirus</i>	C	X	X
<i>Lepomis megalotis</i>	C	X	X
<i>Lepomis microlophus</i>	U	X	X
<i>Lepomis miniatus</i>	R	X	X
<i>Lepomis symmetricus</i> *	U	X	X
<i>Micropterus punctulatus</i> *	U	X	X
<i>Micropterus salmoides</i>	C	X	X
<i>Pomoxis annularis</i>	C	X	X
<i>Pomoxis nigromaculatus</i>	U	X	X
<i>Ammocrypta clara</i>	U	X	
<i>Etheostoma asprigene</i> *	R	X	X
<i>Etheostoma chlorosomum</i> *	U	X	X
<i>Etheostoma collettei</i> *	R	X	
<i>Etheostoma gracile</i>	C	X	X
<i>Percina macrolepida</i> *	U	X	X
<i>Percina maculata</i> *	R	X	X
<i>Percina sciera</i>	U	X	
<i>Percina shumardi</i>	U	X	X
<i>Aplodinotus grunniens</i>	A	X	X

\* A species first collected from the Arkansas segment of the Red River in this study.

specimens, UMMZ 170013).

Reeves (1953) provided records for the Alabama shad, *Alosa alabamae*, from the Little River of Oklahoma, a Red River tributary. *Alosa alabamae*, an anadromous species, had to ascend the Arkansas portion of the Red River to reach spawning habitat in the Little River of Oklahoma, increasing the known Red River fauna of Arkansas to 45 species.

Buchanan (1973) provided distribution maps showing all known species records and localities for the Red River in Arkansas. This was a summary of all known previous collections, but nine additional species were added to the list of fishes known from the Red River. These nine new species came from Arkansas Game & Fish Commission records of gill netting samples from the Red River in the 1960s and from seine collections at five localities by Buchanan in 1972, bringing the total known fish species in the Red River to 54.

The next, and until now most intensive, fish sampling on the Red River in Arkansas was a survey of the fishes from Index, Arkansas (U.S. Hwy. 71 bridge) to Shreveport, Louisiana by Kelly H. Oliver from December 1978 through July 1979 (Dorris et al., 1979). Oliver sampled 13 mainstem sites in the lower half of the Arkansas portion of the Red River and four mainstem sites in Louisiana. Each site was

sampled from one to three times by gill nets, seines, and/or electrofishing; occasional creel censuses were made when local fishermen were encountered. Oliver's field notes and collection site species lists were lost, and it is not possible to precisely determine which fish species were found in the Arkansas portion of the Red River from the data presented in the report (Dorris et al., 1979). Eight species reported by Oliver from the Red River mainstem were possibly misidentified. No voucher specimens of the eight questionable species were available for examination, and those species were not considered as part of the documented Red River fauna. Because 57 of the 58 species reported from the mainstem of the Red River were found in the Arkansas segment of the river, we accept 10 of the species listed by Oliver as new Red River records for Arkansas, bringing the total known mainstem species to 64. All 10 of Oliver's new species records were subsequently confirmed from the Red River by other collectors.

From 1973 to 1987, Robison and Buchanan (1988) made 27 fish collections by seine in the Red River mainstem between the Oklahoma and Louisiana state lines. These collections added four additional species to the known Red River fish fauna of Arkansas, bringing the known species total to 68.

Table 2. Fish species historically known from the Red River in Arkansas but not collected in the 1995-2001 sampling.

Species	Collector and/or author first reporting species
<i>Ichthyomyzon castaneus</i>	Robison and Buchanan (1988)
<i>Amia calva</i>	Bailey, 1940 (Buchanan, 1973)
<i>Anguilla rostrata</i>	Buchanan (1973)
<i>Alosa alabamae</i>	Reeves (1953)
<i>Campostoma anomalum</i>	Oliver (Dorris et al., 1979)
<i>Hybognathus placitus</i>	Black (1940)
<i>Luxilus chrysocephalus</i>	Black (1940)
<i>Notropis bairdi</i>	Black (1940)
<i>Pimephales promelas</i>	Oliver (Dorris et al., 1979)
<i>Ameiurus melas</i>	Black (1940)
<i>Mugil cephalus</i>	Oliver (Dorris et al., 1979)

### Methods

Main channel Red River habitats in four counties of Arkansas from the Oklahoma state line to the Louisiana state line were sampled by seines and rotenone from 1995 through 2001 and by gill nets, hoop nets, and trotlines in 1997 and 1998 (Fig. 1). Ninety-one seine and/or rotenone samples were taken in the following four mainstem habitats: main river channel in slow to swift current along point bars and islands, chutes, backwaters adjacent to main channel, and sandbar pools. Seine collections were made with 6 x 1.5 m and 9 x 1.5 m nylon seines of 3.2 mm mesh. Small-scale samples were made with rotenone in areas of little or no current. Sampling time by seine and rotenone averaged 1.0 hour per site and ranged from 0.5 to 2.0 hours. Specimens were preserved in 10% formalin and later transferred to 45% isopropanol. All preserved fishes were identified in the laboratory, and specimens were deposited in the Zoology Collection of the University of Arkansas – Fort Smith.

Five localities in the Arkansas segment of the Red River were sampled with gill nets and hoop nets between March and June 1997, and the three most downstream of those localities were sampled with gill nets and hoop nets between January and July 1998 (Fig. 1), for a total of eight site-samples during the two sampling periods. Each site included a river reach of approximately 8 km. Hoop nets 1.2 m in

diameter with 3.8 cm bar mesh were used in deep water, and hoop nets 0.9 m in diameter with 3.8 cm bar mesh were used in shallow water. The hoop nets were checked twice daily, just after sunrise and just before sunset. Experimental gill nets consisting of three 30 m panels one each of 5.1, 7.6, and 10.2 cm monofilament webbing were checked at approximately two-hour intervals. At the two most downstream sampling localities, trotlines baited with golden shiners were used in 1997. A total of 378 hoop net nights, 24 gill net nights, and 8 trotline nights represented approximately 5000 hours of sampling at the five sites.

Present status in the Red River was assigned to each fish species collected in this study (Table 1) based on a combination of habitats sampled, sampling methods used, and number of individuals collected. Species collected mainly by seines and/or rotenone were assigned a status as follows: (1) Abundant – more than 700 specimens collected and the species taken in more than 60 samples, (2) Common – 100-700 specimens collected and taken in 25-59 samples, (3) Uncommon – 11-99 specimens collected and taken in 5-24 samples, and (4) Rare – 1-10 specimens collected and taken in 1-4 samples.

Species taken almost exclusively by hoop nets, gill nets, and trotlines were assigned a status as follows: (1) Abundant – more than 100 specimens collected and taken in seven or eight of the eight site-samples during 1997 and 1998, (2)

## Fishes of the Red River in Arkansas

Common – 30-99 specimens collected and taken in five or six site-samples, (3) Uncommon – 5-15 specimens collected and taken in three or four site-samples, and (4) Rare – 1-4 specimens collected and taken in one or two site-samples.

Species meeting only one of the two criteria (number of specimens and number of sites) for a given rank in the above two ranking systems were assigned to the next lower ranked category. A few species, which were taken in a variety of habitats and by a variety of methods, were assigned a rank by using a combination of the two previously described ranking systems.

To compare fish species richness and distribution of the Arkansas segment of the Red River with the much longer Red River segments upstream and downstream from Arkansas, several data sources were consulted. Fish distribution records in the Red River upstream from Arkansas were obtained from Hargrave (2000), Miller and Robison (1973), Riggs and Bonn (1959), Sublette et al. (1990), the University of Oklahoma Museum of Natural History, and the Oklahoma Department of Environmental Quality records from Red River fish sampling stations. Fish distribution records in the Red River downstream from Arkansas came from Douglas (1974) and the University of Louisiana at Monroe and Tulane University fish collection databases. Fish species similarity of the Red River segments upstream and downstream from Arkansas was compared with the Arkansas segment by using the index of similarity (S) of Odum (1971),  $S=2C/A+B$ , where C is the number of fish species common to two segments being compared, A is the total number of species in one segment, and B is the total number of species in the other stream segment.

### Results

Seventy-two fish species and one hybrid combination (38 specimens of *Morone chrysops* x *M. saxatilis*) were collected from the Red River mainstem in Arkansas (Table 1). Fifteen species were new records, bringing the total number of species historically known from the Red River in Arkansas to 83. Prior to this study, 68 fish species were historically reported from the Red River in Arkansas, and 11 of those species were not collected in our 1995-2001 sampling (Table 2). Fish sampling in the Arkansas segment of the Red River in 1999 and 2000 by the U.S. Army Corps of Engineers produced no additional new species records (pers. comm., J. Kilgore, U.S. Army Corps of Engineers Waterways Experiment Station, Vicksburg, MS).

The species collected in this study were distributed among 17 families. More than 84% of the specimens collected were in the minnow family, Cyprinidae. The four next most abundant families by number of specimens collected were Centrarchidae (5%), Clupeidae (3%), Catostomidae (1.7%), and Atherinopsidae (1.4%). The ten

most abundant species in decreasing order of number of specimens collected were as follows: *Notropis atherinoides*, *N. potteri*, *Cyprinella lutrensis*, *Pimephales vigilax*, *N. shumardi*, *Lepomis humilis*, *Dorosoma petenense*, *Macrhybopsis storeriana*, *Menidia beryllina*, and *Carpiodes carpio*. Six species represented by only a single specimen each were as follows: *Polyodon spathula*, *Ctenopharyngodon idella*, *Phenacobius mirabilis*, *Ictiobus niger*, *Fundulus blairae*, and *F. olivaceus*.

In general, the 10 most abundant species were also the most widely distributed species in the study area based on the number of collections in which they were found. Only *N. shumardi* among the 10 most abundant species was not among the 10 most widely distributed species (falling to twelfth most widely distributed). The ten species appearing in the greatest number of collections in decreasing order were as follows: *C. lutrensis*, *P. vigilax*, *N. atherinoides*, *M. beryllina*, *D. petenense*, *M. storeriana*, *D. cepedianum*, *N. potteri*, *C. carpio*, and *L. humilis*.

### Discussion

The Red River exhibits the well-documented pattern of increasing fish species richness from headwaters to downstream (Horwitz, 1978; Matthews, 1998), and the Arkansas segment of the Red River has high fish species richness. Approximately 124 fish species are historically known from the entire Red River. Eleven percent of the Red River mainstem length and 6.4% of the total Red River drainage area are in Arkansas, and 83 species are historically known from the Arkansas segment. This is approximately 67% of the entire Red River fish fauna, and 58% percent of the mainstem fish fauna was found in this study. Ninety fish species are known from the Red River upstream from Arkansas, and 106 species are known from the Red River downstream from Arkansas. Two species *Etheostoma collettei* and *Percina maculata* have been reported only from the Arkansas segment, 11 species from the Arkansas segment have not been reported upstream from Arkansas, and seven species found in Arkansas have not been reported from the Red River in Louisiana. In this study, the Arkansas segment of the Red River had 61% of the species known from the downstream segment and 68% of the species reported from the upstream reaches. Based on the similarity index (S) of Odum (1971), the fish species composition of the Arkansas segment of the Red River is slightly more similar to the river segment upstream from Arkansas ( $S=.83$ ) than to the downstream segment ( $S=.80$ ). Species historically known from the Arkansas segment comprise 80% and 72% of the species reported from the upstream and downstream segments, respectively.

One currently abundant species, *Notropis potteri*, occurs in the Arkansas portion of its range only in the main channel of the Red River. This species occurred throughout the



study reach and was the second most abundant species found with nearly 10,000 specimens collected. A single specimen of *Phenacobius mirabilis* was the first record of that species from the mainstem Red River in Arkansas and was only the second specimen of that species collected in Arkansas in the last 50 years. The bigscale logperch, *Percina macrolepida*, was first reported in Arkansas from the upper portion of the Red River (Buchanan et al., 1996) and was found throughout the Arkansas segment of the Red River in this study.

The blue sucker, *Cycleptus elongatus*, was the most abundant large species caught by hoop nets and was the third most common large species (after *Carpoides carpio* and *Aplodinotus grunniens*) collected by all methods. The range of *C. elongatus* has drastically declined in recent decades, and it is currently more abundant in the Red River than in any other river in Arkansas. Two specimens of alligator gar, *Atractosteus spatula*, another declining big river fish were collected. Layher (1998) provided additional data on large species collected from the Red River by hoop nets, gill nets, and trotlines.

Eleven species previously reported from the Red River in Arkansas were not found in this study (Table 2). Two of those species, *Campostoma anomalum* and *Luxilus chrysocephalus*, probably are accidentals from tributaries. It is likely that additional Red River floodplain and tributary species could occasionally be taken in future main channel sampling.

Three of the historically reported species not found in our study have probably been extirpated from the Arkansas segment of the Red River. The Alabama shad, *Alosa alabamae*, was reported from the Little River, a Red River tributary in Oklahoma (Reeves, 1953; Miller and Robison, 1973). That anadromous species is no longer able to ascend the Little River to reach its former spawning areas in Oklahoma due to the 1963 construction of Millwood Dam on Little River in Arkansas. *Alosa alabamae* still successfully ascends the lower 55 km of the Red River Navigation System in Louisiana to enter and spawn in the Ouachita River in Arkansas (Buchanan et al., 1999). The plains minnow, *Hybognathus placitus*, and the Red River shiner, *Notropis bairdi*, have not been reported from the Arkansas segment of the Red River in more than 60 years. Both of those primarily Great Plains species are common today in the Red River upstream from Lake Texoma, and small populations of those species persisted into the mid 1990s in the Red River of Oklahoma downstream from Lake Texoma (pers. comm., J. Pigg, Oklahoma Department of Environmental Quality). It is possible that future fish sampling could produce sporadic records of *H. placitus* and *N. bairdi* in the Red River of Arkansas because both species were taken at an Oklahoma Department of Environmental Quality fish sampling site on the Red River near DeKalb,

Texas, 18 km upstream from the Arkansas state line as recently as 1995. Unsuccessful attempts were made to collect both species in the Arkansas portion of the Red River near the Oklahoma state line in each year of this study.

Human alteration of the Red River has likely caused the extirpation of *A. alabamae*, *H. placitus*, and *N. bairdi* from the Arkansas segment of that river. Construction of the Red River Navigation System in Louisiana impedes or blocks access of *A. alabamae* to former upstream tributaries of the Red River in Arkansas and Oklahoma, and dams on Little River also block access to former spawning sites. The impoundment of Lake Texoma by Denison Dam on the Red River in Oklahoma in 1944 fragmented the ranges of *H. placitus* and *N. bairdi*, creating a more precarious situation for populations of those species downstream from Denison Dam. Great Plains streams typically experience environmental fluctuations that can lead to the extirpation of local populations of fish species (Luttrell et al., 1999). A species whose range has been fragmented by a dam has little possibility of repopulation if populations above or below the dam are lost. Winston et al. (1991) documented major changes in the fish community in the North Fork of the Red River in Oklahoma, including extirpation of four minnow species following construction of Altus Dam on that river. The small populations of *H. placitus* and *N. bairdi*, known from the Red River in Oklahoma below Denison Dam as recently as the 1990s, have little chance of repopulation from the larger populations of those species upstream from Lake Texoma if they are extirpated.

The mouth of the Little River, just west of Interstate Hwy 30, divides the Arkansas segment of the Red River into two nearly equal parts. The Red River upstream from the Little River mouth, especially upstream from the U.S. Hwy 71 bridge, has been altered very little by manmade structures, whereas the Red River downstream from the Little River mouth has numerous levees, wingdikes, and revetted banks. We found no substantial differences in fish species richness between the upstream (67 species) and downstream (65 species) segments in Arkansas. Seven species were found only in the upstream segment, and five species were found only in the downstream segment (Table 1). Some species found in both river segments in Arkansas were more abundant in one segment based on number of specimens taken and the number of samples in which they occurred. *Macrhybopsis hyostoma*, *Notropis buchanani*, *Labidesthes sicculus*, *Etheostoma asprigene*, and *E. chlorosomum* were more abundant in the upstream segment of the Red River in Arkansas, and *Lepisosteus oculatus*, *Cyprinella venusta*, and *Morone mississippiensis* were more abundant in the downstream segment.

The U.S. Army Corps of Engineers has proposed a project to extend the Red River Navigation System 217 km



## Fishes of the Red River in Arkansas

upstream from Shreveport, Louisiana to Index, Arkansas near U.S. Highway 71. This project, currently estimated to cost one billion dollars, would require the construction of three to five locks and dams, over 100 dikes, extensive rock revetments, and other channel modification structures. It is not possible to precisely predict the effects of such a project on the fish community of the Red River; however, such a drastic modification of the environment would likely have major impacts on fish species richness, diversity, and distribution. Some species would increase in abundance, while others would decrease or even be extirpated from large sections of the river. This study of the fishes of the Arkansas segment of the Red River should provide a baseline for determining future changes in fish species distribution and abundance.

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