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Distribution and Status of the Kiamichi Shiner, *Notropis ortenburgeri* Hubbs (Cyprinidae)

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Abstract

The Kiamichi shiner, *Notropis ortenburgeri*, a diminutive, silvery, upland stream fish in southwestern Arkansas and eastern Oklahoma was studied from 1999-2001 to determine its distribution, habitat, and conservation status in Arkansas and Oklahoma. Eighty-five collections were made during the two-year study. The present distribution in Arkansas and Oklahoma is described as well as the conservation status of the Kiamichi shiner in both states.

Introduction

The Kiamichi shiner, *Notropis ortenburgeri* Hubbs, is a small, slim, silvery shiner, which occupies small to moderate-sized, clear upland streams of moderate gradient in the Ouachita Highlands of Arkansas and Oklahoma (Robison, 1980). This shiner was originally described by Carl L. Hubbs in Ortenburger and Hubbs (1927) from a single specimen collected in the Mountain Fork River (Little River system) in southeastern Oklahoma. Later, Hubbs and Ortenburger (1929) amplified the original description based on additional specimens primarily from the Red River drainage. Since that time, little has been published concerning this diminutive shiner other than notations regarding locality records or cursory descriptions of ecological requirements (Miller and Robison, 1973; Finnell et. al., 1956; Pigg and Hill, 1974; Robison, 1980; Robison and Buchanan, 1988).

This one-year survey was to determine the present distribution and conservation status of the Kiamichi shiner in Arkansas and Oklahoma.

Materials and Methods

Fieldwork was conducted from September 1999 through September 2000. Seventy-nine collections of fishes were made to document the presence of the Kiamichi shiner in Arkansas and Oklahoma. Fishes were collected using standard minnow seines varying in length from 4.6-6 m and 1.8 m in height with a bar mesh of either 0.3 or 0.6 cm. Fishes were preserved in 10% formalin in the field and later transferred to 50% isopropyl alcohol for permanent storage. Representative specimens of the Kiamichi shiner were preserved from certain sites where the Kiamichi shiner was deemed common. Associated fishes collected with Kiamichi shiners were also collected and enumerated.

In addition, all known contemporary and historical literature regarding the Kiamichi shiner was reviewed and relevant findings summarized or referenced herein. Museums known to house Kiamichi shiners collected in

Arkansas and Oklahoma were canvassed. Coverage includes the University of Michigan Museum of Zoology (UMMZ), Tulane University (TU), University of Louisiana - Monroe (NLU), Arkansas State University Museum of Zoology (ASUMZ), Oklahoma State University (OSU), Cornell University (CU), and the Sam Noble Oklahoma Museum of Natural History at the University of Oklahoma (OU), and the University of Tulsa (UTULSAC).

Historical Review

The Kiamichi shiner was originally described by Carl L. Hubbs in 1927 from a single specimen collected in the Mountain Fork River (Little River system) in southeastern Oklahoma. Later, Hubbs and Ortenburger (1929) and Cross and Moore (1952) expanded the range of this species. Miller and Robison (1973) provided information about the distribution and habitat of the Kiamichi shiner in their *Fishes of Oklahoma*. Robison (1980) summarized information on the cyprinid for the *Distributional Atlas*. He reported its distribution as upland streams draining the Ouachita Mountains of west central and southwestern Arkansas and eastern Oklahoma, including portions of the Arkansas and Ouachita drainages and the Kiamichi and Little River systems of the Red River drainage.

Relatively little attention has been focused on this small shiner other than notations as to its occurrence and/or abundance in various stream surveys. Even today, little is known about the biology of the Kiamichi shiner.

Taxonomic Comments.—The Kiamichi shiner has not been assigned to a subgenus and no systematic review of the species has been published to date. The closest relative of the Kiamichi shiner is *Notropis melanostomus* from Florida and southern Mississippi (Bortone, 1989), which is considered to be a sister species of *Notropis ortenburgeri* (Suttkus and Bailey, 1990). Hubbs and Raney (1951) suggested a possible relationship with *Notropis cummingsae*, but this has not been investigated.

Type Locality.—The type locality of the Kiamichi shiner is the Mountain Fork River, 16 km southeast of Broken Bow, McCurtain County, Oklahoma (Ortenburger and Hubbs, 1927; Moore, 1973).

Habitat

Except for cursory statements regarding the general nature of the habitat, little has been written on the ecological requirements of *Notropis ortenburgeri*. Hubbs and Ortenburger (1929) described the habitat as “more or less quiet water, of acid reaction (pH 6.8 or less), in the upland streams of southeastern Oklahoma and western, especially southwestern Arkansas.” Black (1940) in a dissertation on the “Fishes of Arkansas” reported the Kiamichi shiner to be similar to the wedgespot shiner (*Notropis greeni*) in its ecology. It is usually found in pools of creeks and rivers and favors the ends of pools near the beginning or end of riffles, where food is no doubt easily secured. In the Little River system, Reeves (1953) reported the Kiamichi shiner to be an inhabitant of small, rocky tributaries of medium size rivers. Miller and Robison (1973) described the habitat as small to moderately sized, clear upland streams in Oklahoma, particularly in quiet pools over large boulder substrates. Pigg and Hill (1974) found *N. ortenburgeri* associated with small to moderate-sized upland streams in the Kiamichi River, Oklahoma. Harris and Douglas (1978) reported this species from clear, deep pools with rocky bottoms in the main Ouachita River. Johnson (1978) described the habitat of the Kiamichi shiner in the Saline River (Red River Drainage) as clear pools over rocky substrate. Herrock (1986) commonly collected the Kiamichi shiner from deep, rock-bottom pools of the headwater tributaries of the Ouachita River. Robison (1980) and Robison and Buchanan (1988) described the habitat of the Kiamichi shiner as pools over gravel, rubble, or boulder-strewn substrates in small to moderate-sized clear upland streams of moderate gradient.

During this study, field collecting was carried out in all major drainages where *Notropis ortenburgeri* was known to occur in an effort to document its habitat more precisely. *Notropis ortenburgeri* was found most frequently in clear, small to moderate-sized upland streams and rivers characterized by moderate to slow gradient. In these upland areas, the Kiamichi shiner tends to inhabit clear, quiet, pools over substrates variously composed of sand, gravel, cobble, and boulders. Such pools typically had a slight flow through them. Rooted aquatic vegetation was generally absent although beds of *Justicia americana* predominated at the edges of many of the pools. *Notropis ortenburgeri* avoided swifter stream sections and riffles. This species seems intolerant of the turbidity and ecological perturbations caused by ditching in agricultural areas and modification of the watershed by clearcutting. Visits to streams previously

occupied by *Notropis ortenburgeri* yielded no specimens, following such environmental alteration.

Species Associates.—Species most closely associated environmentally with *Notropis ortenburgeri* are the striped shiner (*Luxilus chrysocephalus*); brook silverside (*Labidesthes sicculus*), blackspotted topminnow (*Fundulus olivaceus*), longear sunfish (*Lepomis megalotis*), smallmouth bass (*Micropterus dolomieu*), and greenside darter (*Etheostoma blennioides*).

Distribution

Notropis ortenburgeri was initially discovered in the Mountain Fork River (Little River system) about 16 km (10 mi.) southeast of Broken Bow, McCurtain County, in southeastern Oklahoma. This small range was later expanded into the Arkansas River drainage of both eastern Oklahoma and western Arkansas (Hubbs and Ortenburger, 1929; Cross and Moore, 1952). Hubbs et al. (1954) erroneously extended the distribution of the Kiamichi shiner southward to include eastern Texas within the range. This error was later repeated by Moore (1968) and Miller and Robison (1973). Reexamination of the Texas specimens by HWR revealed them to be *Notropis hubbsi* described by Bailey and Robison (1978). Texas is thus deleted from the known range of *N. ortenburgeri*.

Presently the Kiamichi shiner is known only from streams draining the Ouachita Mountains of eastern Oklahoma and west-central and southwestern Arkansas, Kiamichi River, and Little River system (Red River drainage) and Ouachita River drainages. In addition, there are several problematic localities previously reported from north of the Arkansas River in Osage, Delaware, and Tulsa counties, Oklahoma. The presence of small populations of *Notropis ortenburgeri* north of the Arkansas River in Oklahoma is puzzling when viewing the geographic range and abundance of this species in the Ouachita Mountains in southeastern Oklahoma and southwestern Arkansas.

On 12 August 1936, W. F. Blair (biology professor at Tulsa University) reported *Notropis ortenburgeri* from a collection of 20 species below the dam on Spavinaw Creek in Delaware County, Oklahoma (Moore, 1973). As the specimens were identified by Carl L. Hubbs, the original describer, the identities seem valid (G. A. Moore, pers. comm.); however, no additional specimens have ever been taken from this Ozarkian stream making this collection suspect. Several other records have been reported from northeastern Oklahoma including Osage County, Oklahoma at Sand Creek collected by G. A. Moore and F. M. Baumgartner on 13 April 1940 and Lost Creek (Sec. 36, T26N, R10E) by W. F. Blair on 1 August 1936. HWR was unable to locate these specimens to verify their

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continued existence and identification. Recent extensive collecting of Sand Creek by W. J. Matthews failed to find any specimens of the Kiamichi shiner (W. J. Matthews, University of Oklahoma, pers. comm.). Warren Adams (a former student at Tulsa University, pers. comm.) collected small numbers of *N. ortenburgeri* from Turkey Creek in Osage County in the 1970s. Two specimens (UTULSAC 2511) from Bird Creek, Tulsa County, Oklahoma, represent the westernmost known locality of *N. ortenburgeri*. Unfortunately, these collections also can not be located presently. Intensive collecting in northeastern Oklahoma over the years has substantiated the rarity of this species north of the Arkansas River in Oklahoma as no additional collections are known. These previous collections in Osage, Delaware and Tulsa Counties, may represent the remnants of a once more widely distributed population occupying the western Ozark foothills. Interestingly, no collections of *Notropis ortenburgeri* have been made north of the Arkansas River in Arkansas (Robison and Buchanan, 1988).

Notropis ortenburgeri seems to rather common only in the upper Ouachita tributaries (particularly Wingfield and Hollywood creeks of the Little Missouri River system) in Arkansas. Northward into the Arkansas River drainage (e.g. the Poteau River system), the Kiamichi shiner becomes more rare. Southward, in the Little River system of southwestern Arkansas and Oklahoma and in the Kiamichi River of Oklahoma, the species also becomes less common. The western range limit of this species in the Ouachitas is McGee Creek, a tributary of Muddy Boggy River, 0.8 km (0.5 mile) west of the divide between the Kiamichi and Muddy Boggy River drainages (Pigg, 1977).

The following is a presentation of the distribution of the Kiamichi shiner by river system or main river area. Comments are made concerning this shiner's historical presence, plus the findings of this survey are given.

Arkansas

Fourche La Fave River System (Arkansas River Drainage).—Black (1940) reported the Kiamichi shiner from the upper Fourche la Fave River for the first time. Both Robison (1980) and Robison and Buchanan (1988) mapped the distribution of this species in the Fourche la Fave River system. A total of 8 specimens was taken in 5 collections from the Fourche la Fave River from three localities during this study. The localities in Scott County, Arkansas are as follows: (1) Fourche la Fave at gravel road 0.8 km (0.5 mile) southeast of Boles (5 specimens); (2) Brush Creek at AR St. Hwy. 28 bridge (2 specimens); (3) Black Fork Creek, 14.4 km (9 mi.) south of Winfield on gravel road (1 specimen). This shiner appears to be rare in the various upper tributaries of the Fourche la Fave River system.

Upper Poteau River System (Arkansas River Drainage).—Black (1940) mapped a single occurrence of the Kiamichi shiner from the upper Poteau River in Arkansas. In this study, no specimens of the Kiamichi shiner were collected although 5 collections were made in the upper Poteau River system (Table 1).

Upper Ouachita River and Smaller Tributaries.—Harris (1977) collected 57 specimens of the Kiamichi shiner from a single locality in the upper Ouachita River at U.S. Hwy. 71 bridge (Sec. 21/28, T1S, R30W), Polk Co. This single collection of 57 Kiamichi shiners was the only time Harris (1977) took this shiner, although he made 76 collections from 26 different localities in the upper Ouachita River system and collected over 40,000 individual fishes. J. E. Herrock (1986) subsequently surveyed the upper Ouachita River system almost 10 years later and collected 330 specimens of the Kiamichi shiner in only 2 collections, although he made 74 collections from 31 different localities and captured a total of 28,412 specimens distributed among 61 different species. The localities in Polk County were (1) Ouachita River at bridge on gravel road approximately 45 m north of U.S. Hwy. 270 and 7.2 km (4.5 mi.) west of Acorn (Sec. 14, T1S, R31W) (1 specimen) and (2) Ouachita River at U.S. Hwy. 71 bridge at Acorn (Sec. 21/28, T1S, R30W) (329 specimens).

A total of 10 collections of fishes was taken from the upper Ouachita River in Polk County. These yielded 109 specimens of the Kiamichi shiner at 3 localities: (1) Ouachita River at gravel road 7.2 km (4.5 mi.) west of Acorn (Sec. 14, T1S, R31W) (79 specimens); (2) Ouachita River at U.S. Hwy. 71 at Acorn (Sec. 21/28, T1S, R30W) (21 specimens); (3) Ouachita River at gravel road (Sec. 27, T2S, R30W) (9 specimens).

Lower Ouachita River.—Raymond (1975) surveyed the fishes of the lower Ouachita River from the Rammel Dam to the AR/LA state line. He did not record any Kiamichi shiners from the lower Ouachita River. No collections were made in the lower Ouachita River during this study.

Little Missouri River System (Ouachita River Drainage).—Three localities for the Kiamichi shiner were shown by Black (1940) (Map 4; p. 247). Interestingly, Myers (1977) did not collect a single specimen of the Kiamichi shiner in his survey of the fishes of the Little Missouri River, although he took 91 species in 58 collections from 20 localities and a total of 23,852 specimens. In a subsequent survey of the same river system, Loe (1983) collected 98 species in 57 collections from 35 localities and a total of 25,039 specimens, but he also failed to collect the Kiamichi shiner. Ponder (1983) surveyed Terre Noire Creek, the largest lower tributary of the Little Missouri River, and took 392 individuals of the Kiamichi shiner from 6 localities out

of 44 collections from 28 different localities and 20,010 specimens distributed among 78 fish species. The 6 localities in Clark County where the Kiamichi shiner was collected are (1) Terre Noire Creek at AR St. Hwy. 8, 6.4 km east of Alpine (Sec. 26, T6S, R22W) (172 specimens); (2) Hollywood Creek at TAR (Timber Access Road), 11.2 km east of Alpine (Sec. 28, T6S, R21W) (185 specimens); (3) Terre Noire Creek at TAR, 12.8 miles NW of Hollywood (Sec. 3, T7S, R22W) (1 specimen); (4) Terre Noire Creek at TAR, 3.7 km south of junction of AR St. Hwy. 8 (Sec. 34, T6S, R22W) (4 specimens); (5) Hollywood Creek at TAR, 4 km east of AR St. Hwy 53 (Sec. 10, T7S, R21W) (29 specimens); and (6) Terre Noire Creek at AR St. Hwy 26, 4.0 km west of Hollywood (Sec. 31, T7S, R21W).

In this study, a total of 12 collections of fishes was made from the Little Missouri River system, and 210 specimens of the Kiamichi shiner were captured from the 10 localities. The 10 collection sites in Clark County are (1) Hollywood Creek at AR St. Hwy. 8 (Sec. 28, T6S, R21W) (123 specimens); (2) Hollywood Creek at TAR (Sec. 4, T7S, R21W) (3 specimens); (3) Hollywood Creek at TAR (Sec. 10, T7S, R21W) (5 specimens); (4) Hollywood Creek at AR St. Hwy. 8 (Sec. 28, T6S, R21W) (10 specimens); (5) Hollywood Creek at Hollywood, AR (Sec. 28, T7S, R21W) (2 specimens); (6) Bell Creek at TAR (Sec. 18, T7S, R21W) (48 specimens); (7) Bell Creek at AR St. Hwy. 26 (Sec. 35/36, T7S, R22W) (1 specimen); (8) Terre Noire Creek at AR St. Hwy 26 (Sec. 31, T7S, R22W) (3 specimens); (9) Terre Noire Creek at AR St. Hwy 8 (Sec. 26, T6S, R22W) (9 specimens); (10) Terre Noire Creek at TAR (Sec. 14, T6S, R22W) (6 specimens). The Kiamichi shiner seems to favor the upland tributaries of this system, especially in the upper areas of Hollywood Creek, Bell Creek, and Terre Noire Creek where it is common and locally abundant.

Saline River System (Ouachita River Drainage).—William J. Matthews (pers. comm.) has collected the Kiamichi shiner from the upper Saline River system (Ouachita River drainage), and several years ago, HWR was asked to identify some of these fish specimens. These specimens were identified as the Kiamichi shiner, *Notropis ortenburgeri*. The discovery of the Kiamichi shiner in the upper Saline River is indeed interesting, given the fact that two intensive surveys by graduate students from Northeast Louisiana University (Reynolds, 1971; Stackhouse, 1982) failed to find a single specimen of this shiner despite the combined effort of 177 collections from 82 localities and a total of 64,555 individual fishes taken from the Saline River system. The discovery of this diminutive shiner in a small upland tributary in the Saline River system by Matthews after such a massive effort by others reinforces the idea that we still have much to learn about the distributions of a number of our smaller stream fishes.

To date, 321 specimens of the Kiamichi shiner have been taken from six localities in Saline County in the upper region of the South Fork of Alum Creek of the Saline River in Saline County, Arkansas (W. J. Matthews, pers. comm.). The 6 localities in Saline County are (1) Station 1—South Fork of Alum Creek, (Sec. 27, T2N, R19W) (2 specimens); (2) Station 2—South Fork of Alum Creek (Sec. 27, T2N, R19W) (217 specimens); (3) Station 3—South Fork of Alum Creek (Sec. 27, T2N, R19W) (3 specimens); (4) Station 4—South Fork of Alum Creek (Sec. 27, T2N, R19W) (94 specimens); (5) Station 5—South Fork of Alum Creek (Sec. 29, T2N, R19W) (3 specimens); (6) Station 6—South Fork of Alum Creek (Sec. 32, T2N, R19W) (2 specimens). Four collections made by HWR and crew failed to include any additional specimens of the Kiamichi shiner in the upper Saline River system (Table 1).

Caddo River System (Ouachita River Drainage).—Neither Fruge (1971) nor L. W. Herrock (1986) found any Kiamichi shiners in their independent fish surveys of the Caddo River, thus the Kiamichi shiner is not believed to inhabit this river system.

In the present study no specimens of the Kiamichi shiner were taken, although 10 collections were made in the Caddo River system (Table 1).

Mountain Fork River System (Red River Drainage).—Black (1940) reported a single locality for the Kiamichi shiner in the upper Mountain Fork River of Arkansas. In this study, no specimens of the Kiamichi shiner were collected, although 5 collections were made in this system (Table 1).

Rolling Fork River System (Red River Drainage).—Black (1940) did not show any collection localities for the Kiamichi shiner. Corkern (1979) surveyed the fishes of the Rolling Fork River and found 13 specimens of the Kiamichi shiner at two different locations. The 2 locations are (1) Rolling Fork River at FAS road, 7 km west of Gillham (sec. 29, T7S, R32W) (12 specimens) and (2) Rolling Fork River at County Rd. 132 bridge, west of DeQueen (Sec. 14, T8S, R32W) (1 specimen). The 13 specimens of the Kiamichi shiner were collected out a total of 17,264 specimens distributed within 67 species from 38 collections from 13 localities. Five collections were made in this study from the Rolling Fork River system without finding a single specimen of the Kiamichi shiner (Table 1).

Cossatot River System (Red River Drainage).—A single location in the upper Cossatot River was shown by Black (1940) for the Kiamichi shiner. Although 5 collections were made in this river system, no additional specimens of the Kiamichi shiner were taken (Table 1).

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Saline River System (Red River Drainage).—Black (1940) showed a single occurrence of the Kiamichi shiner in a tributary of the Saline River system, a tributary of the Little River (Red River drainage). Johnson (1978) surveyed the fishes of the Saline River system in western Arkansas. He made 55 collections from 21 localities throughout the Saline River system and took 22,468 specimens of fishes, only 11 of which were Kiamichi shiner. The 11 individuals of the Kiamichi shiner were found at only 2 locations in the system. The 2 localities were (1) Saline River below Dierks Dam, about 4 miles west of Dierks, AR (Sec. 21, T7S, R29W) (4 specimens) and (2) Saline River at bridge on gravel road about 3.5 miles west of Dierks, AR (Sec. 27/28, T7S, R29W) (7 specimens). Five collections of fishes from this river system failed to find the Kiamichi shiner during this study (Table 1).

Oklahoma

Arkansas River Drainage.—The presence of *N. ortenburgeri* north of the Arkansas River in Oklahoma is puzzling when viewing the geographic range and abundance of this species in the Ouachita Mountains in southeastern Oklahoma and southwestern Arkansas. On 12 August 1936, W. F. Blair reported *Notropis ortenburgeri* from a collection of 20 species below the dam on Spavinaw Creek in Delaware County, Oklahoma. As the specimens were identified by Carl L. Hubbs, the original describer, the identities are probably valid. Several other record sites for *N. ortenburgeri* are available from northeastern Oklahoma including Osage County, Oklahoma at Sand Creek, a tributary of the Caney River. Kiamichi shiners were collected by G. A. Moore and F. M. Baumgartner on 13 April 1940 as mentioned by Cross and Moore (1952). Kiamichi shiners were also collected from Lost Creek (Sec. 36, T26N, R10E) by W. F. Blair on 1 August 1936. In the 1970's Warren Adams (pers. comm.) collected small numbers of *N. ortenburgeri* from Turkey Creek in Osage County, Oklahoma. Two specimens (UTULSAC 2511) were taken from Bird Creek, Tulsa County, representing the westernmost known locality of *N. ortenburgeri*; however, these specimens can not now be located. Intensive collecting of northeastern Oklahoma over the years by W. J. Matthews and others has substantiated the rarity of this species north of the Arkansas River in Oklahoma. Not a single collection has been made north of the Arkansas River in over three decades, despite substantial collections being made from these target areas. These relict populations in Osage, Delaware, and Tulsa counties, Oklahoma may represent the remnants of a once more widely distributed population occupying the western Ozark foothills, but probably no longer exist. Interestingly, no collections of *Notropis ortenburgeri* have been reported north of the Arkansas River in Arkansas (Robison and Buchanan, 1988).

Poteau River System (Arkansas River Drainage).—Cross and Moore (1952) surveyed the fishes of the Poteau River system and reported two locations for the Kiamichi shiner in the Oklahoma portion of their survey. Black (1940) had earlier figured 1 locality for the Kiamichi shiner in the upper Poteau River in Arkansas near Waldron, Arkansas (Hubbs and Ortenburger, 1929). No collections were made in Oklahoma from the Poteau River system in this survey.

Kiamichi River System (Red River Drainage).—Pigg and Hill (1974) surveyed the fishes of the Kiamichi River system from 1972-1973. In their study they also included collections from a number of ichthyologists and museums. They found the Kiamichi shiner to be very common in all areas of the river except near the mouth and in lowland tributaries. The Kiamichi shiner was associated with small to moderate-sized upland streams. Echelle and Schnell (1976) performed a factor analysis of species associations among fishes of the Kiamichi River. The Kiamichi shiner was mentioned as a member of the "brook silverside" group of fishes, a group that seems to prefer the more sluggish sections of small to large relatively clear streams in the upper section of the Kiamichi River system. However, in the 1980s W. J. Matthews and R. C. Cashner surveyed the Kiamichi River system and found the species to be scarce (W. J. Matthews, pers. comm.).

Ten collections from 9 localities were made in the upper Kiamichi River system during this study (Table 1). The Kiamichi shiner was found at 4 localities in the upper Kiamichi River system and 68 specimens were collected. The four localities in LeFlore, OK were (1) Kiamichi River at U.S. Hwy. 259 south of Big Cedar (Sec. 14, T2N, R25E) (39 specimens); (2) Kiamichi River at OK St. Hwy 63 east of Big Cedar (Sec. 18, T2N, R26E) (17 specimens); (3) Little Cedar Creek at OK St. Hwy 63 (Sec.7, T2N, R25E) (11 specimens); (4) Billy Creek at Billy Creek Recreation Area (Sec. 36, T3N, R24E) (1 specimen). The Kiamichi shiner appears to be a fairly widespread, but relatively uncommon inhabitant of the upper Kiamichi River system.

Little River System (Red River Drainage).—Reeves (1953) surveyed the fishes of the Little River system in Oklahoma in a doctoral dissertation. He found the Kiamichi shiner at six stations and commented that it was "nowhere abundant." Finnell et al. (1956) collected 33 specimens of the Kiamichi shiner from the Little River. No collections were made in this study in the mainstem Little River in Oklahoma.

Mountain Fork River (Little River Tributary, Red River Drainage).—Finnell et al. (1956) collected 10 specimens of the Kiamichi shiner from Lick Creek, a tributary of the Mountain Fork River. Additional specimens were available from the OU museum. No collections were made in the

Mountain Fork River system in the Oklahoma portion of its drainage during this study.

Glover River (Little River Tributary, Red River Drainage).—Taylor and Wade (1972) provided an inventory of the biological resources of the Glover River watershed. They did not collect any Kiamichi shiners in their survey, although they made 50 collections and collected 11,038 individual fishes in 50 species. Five collections were made in the Glover River in Oklahoma during the present study; however, no specimens of the Kiamichi shiner were taken. However, there are 159 specimens of the Kiamichi shiner housed at the OU museum, which document its presence in the Glover River.

In summary, the Kiamichi shiner inhabits upland streams of the Kiamichi River, Little River system (Red River drainage), and Ouachita River drainages flowing out of the Ouachita Mountains of eastern Oklahoma and west-central and southwestern Arkansas, respectively. In addition, this shiner formerly occurred in several disjunct localities north of the Arkansas River in Osage, Delaware, and Tulsa counties, Oklahoma (Fig. 1); however, it has not been found in over 30 years in this region despite an intensive search.

Conservation Status

Historical Conservation Status.—Both Robison (1974) and Buchanan (1974) independently concluded that the Kiamichi shiner was rare in Arkansas. Later in their *Fishes of Arkansas*, Robison and Buchanan (1988) listed the Kiamichi shiner as “threatened” within the state in their discussion of the rare and endangered fishes of Arkansas.

In Oklahoma, Robison et al. (1974) listed the Kiamichi shiner as “rare” stating that “disjunct populations of this species make interpretation of its distribution and status difficult.” The Rare and Endangered Species of Oklahoma Committee (1975) also concurred in assigning the Kiamichi shiner a “rare-2” status, which meant the species may be quite abundant where it occurs, but it is known in only a few localities or in a restricted habitat within Oklahoma.

Warren et al. (2000) recently reviewed the status of 662 native freshwater fishes of the southern United States in which Arkansas and eastern Oklahoma were included. Their findings listed the Kiamichi shiner as “vulnerable” which meant a species or subspecies that may become endangered or threatened by relatively minor disturbances to its habitat or that deserve careful monitoring of its distribution and abundance in the continental waters of the United States.

Fishes and the other aquatic fauna are disproportionately imperiled when compared to terrestrial fauna (Warren and Burr, 1994). Interestingly, Warren et al. (2000) found that 6% of the southern fishes were

“endangered” while 7% were considered “threatened” and 15% were “vulnerable.” Williams et al. (1989) listed habitat loss as one of the greatest causes of the declines in populations of native fishes in North America. Widespread reservoir construction and declines in water quality have severely altered most of North America’s clean, free-flowing riverine habitats (Benke, 1990). Sadly, Warren et al. (2000) concluded that the trend for southern fishes in the United States is clear; jeopardized fishes are successively moving from a vulnerable category to that of imminent threat of extinction.

Present Conservation Status.—The state of Arkansas presently has no official state list of threatened or endangered wildlife or plants. Instead, protection is afforded by the Arkansas Game and Fish Commission primarily to federally threatened species.

A total of 79 collections of fishes was made during this study within the historical distribution of the Kiamichi shiner. From these 79 collections, 392 specimens of Kiamichi shiners were captured in Arkansas and Oklahoma (Table 1)). After careful review of all of the major museum holdings available of the Kiamichi shiner, a year of intensive field work collecting Kiamichi shiners, review of all pertinent literature, and discussions with virtually all of the major collectors of Kiamichi shiners in Arkansas and Oklahoma, it seems that the Kiamichi shiner is a widespread, locally-abundant shiner that lives in upland habitats and probably undergoes population fluctuations through time. It seems apparent that it has not precipitously declined in abundance throughout its historical range in Arkansas and Oklahoma (Table 2), although it has been collected in smaller numbers in recent years, primarily because of the tremendous ichthyological field collecting that occurred in the 1970’s, which yielded so many specimens. This “golden period” occurred when fish populations of numerous streams were examined by master’s thesis projects. Many of these projects surveyed Arkansas streams south of the Arkansas River within the geographic range of the Kiamichi shiner.

Table 2 provides a quick view of the abundance of the Kiamichi shiner in major Arkansas and Oklahoma drainages by decade. While certainly not definitive, Table 2 shows the Kiamichi shiner apparently declining in the decade of the 1980s but thriving in the decade of the 1990s. Earlier years show little in the way of trends, other than a gradual increase in numbers after its initial discovery in the 1920s.

On the basis of all known collections of this shiner, good populations of *Notropis ortenburgeri* occur in the upper Kiamichi River system (49.4% of all known collected specimens), Little Missouri River (Terre Noir Creek specifically) (17.1%), and upper Ouachita River system (14 %) (Table 3), but several other historical areas did not

produce specimens of the Kiamichi shiner in this study.

While destruction and modification of habitat from impoundments with concomitant cold water release have harmed numerous small, non-game stream fishes, the Kiamichi shiner has escaped the fate of many other stream fishes because of its upland habitat requirements. These upland habitats are usually located above many of the environmental perturbations that have occurred within the various watersheds where this species resides. Some reduction in population numbers may have occurred due to poor land practices such as road building, farming, clearing of land for pasture, clearcutting, destruction of riparian buffer strips, and other human perturbations that continue in these watersheds. Gravel removal operations in many Arkansas streams (Filipek and Oliver, 1994), nutrient enrichment from the enormous increase in poultry and swine operations, and human population increases probably all threaten populations of this shiner.

During this study the continued presence of the Kiamichi shiner was documented in several of the river systems in Arkansas and Oklahoma from which it was collected historically including the Kiamichi, upper Ouachita, Little Missouri, and Fourche la Pave river systems. No specimens were collected from the Caddo, Mountain Fork, Poteau, Rolling Fork, or Saline river systems, where historically the Kiamichi shiner had been taken. No new populations of the Kiamichi shiner were discovered in river systems where they were previously unknown.

Thus, after reviewing the collection records of the Kiamichi shiner from the UMMZ, NLU, OSU, OU, TU, ASUMZ, UTULSAC, and CU and after a year of field work, the Kiamichi shiner is not herein recommended for official federally threatened status at this time. Rather, this small silvery cyprinid species should be accorded a status of

“vulnerable,” and a program should be initiated to monitor its continued existence in southeastern Oklahoma and southwestern Arkansas. The apparent disappearance from several historical localities makes it imperative that a careful watch on this species be maintained in the future.

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Table 1. Number of collections and Kiamichi shiners obtained in Arkansas and Oklahoma from 1999-2001.

Locality (River System)	No. of Collections	No. Kiamichi Shiners
1. Ouachita River (mainstem)	10	106
2. Caddo River	10	0
3. Little Missouri River	10	210
4. Saline River (Ouachita)	4	0
5. Kiamichi River	10	68
6. Glover River	5	0
7. Mountain Fork River	5	0
8. Rolling Fork River	5	0
9. Cossatot River	5	0
10. Saline River (Red)	5	0
11. Poteau River (AR)	5	0
12. Fourche la Fave River (AR)	5	8
TOTAL	79	392

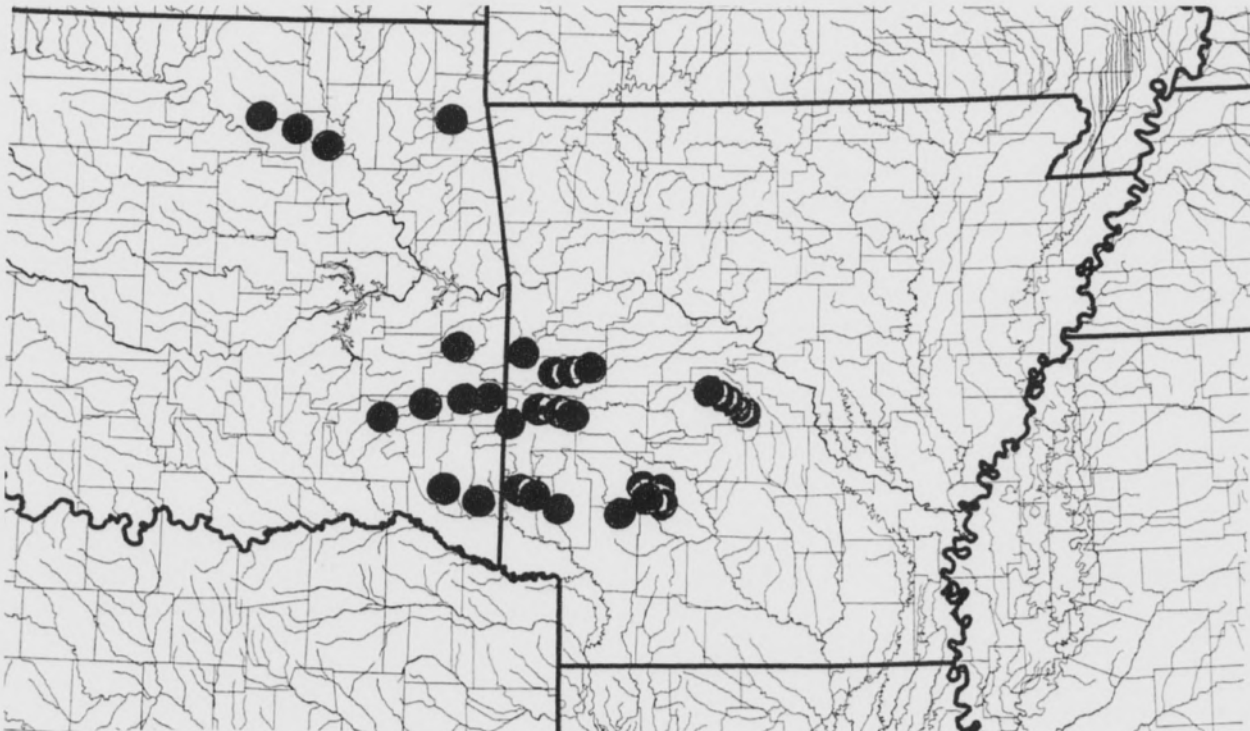
Table 2. Number of Kiamichi shiners collected during various years, 1927-2001.

Years	No. Kiamichi Shiners
1927-1939	23
1940-1949	2
1950-1959	43
1960-1969	137
1970-1979	2,951
1980-1989	563
1990-1999	1,505
2000-2001	395
Totals	5,619

Distribution and Status of the Kiamichi Shiner, *Notropis ortenburgeri* Hubbs (Cyprinidae)

Table 3. Number of the Kiamichi shiners by river system.

River System	No. Kiamichi Shiners	Percentage (%)
Ouachita River	497	14.0
Caddo River	0	0.0
Little Missouri River	605	17.1
Saline River (Ouachita)	321	9.1
Little River	77	2.2
Glover River	159	4.5
Mountain Fork River	50	1.4
Rolling Fork River	13	0.4
Saline River (Red)	11	0.3
Kiamichi River	1,755	49.4
Poteau River	33	0.9
Fourche la Fave River	26	0.7
Total	3,547	100.0

Fig. 1. Distribution of the Kiamichi Shiner, *Notropis ortenburgeri*, in Arkansas and Oklahoma.

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