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Updated Distributional Records of Selected Kentucky Fishes

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Updated Distributional Records of Selected Kentucky Fishes

Abstract

Distribution records for 15 fish species of conservation interest are included for Kentucky. *Notropis dorsalis*, previously undocumented in Kentucky, is reported for the first time (Mayfield Creek drainage). Also reported are state rediscoveries of three species thought to be extirpated from Kentucky: *Ichthyomyzon gagei* (Tennessee River drainage), *Hemitremia flammea* (Lower Cumberland and Green river drainages), and *Hybopsis amnis* (upper Cumberland River drainage). Unreported drainage records comprise nine species: *Ichthyomyzon castaneus* (Salt River drainage and Upper Green River drainage); *Ichthyomyzon unicuspis* (Salt River drainage and upper Big Sandy River drainage); *Campostoma pullum* (Tennessee River drainage); *Umbra limi* (Obion Creek drainage); *Lepomis marginatus* (Blood River system); *Ammocrypta pellucida* (Tygart's Creek drainage); *Nothonotus camurus* (Kinniconick Creek drainage); *Percina sciera* (Salt River drainage); and *Percina squamata* (Laurel River system). Finally, we report range extensions of *Notropis maculatus* (Mayfield Creek drainage and Clarks River system) and *Typhlichthys subterraneus* (Cumberland River drainage). All but four species (*I. unicuspis*, *C. pullum*, *N. camurus*, and *P. sciera*) have a state conservation status designation because they are rare or have limited (e.g., peripheral) distributions in Kentucky.

Keywords

Kentucky, range extension, distribution

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INTRODUCTION

Kentucky has a rich freshwater ichthyofauna that ranks fourth in the nation for native fish species diversity, behind Alabama, Georgia, and Tennessee, which all have more than 250 described species (Etnier and Starnes 1993, Boschung and Mayden 2004, Straight et al. 2009). The fauna is dynamic with new species being described (e.g., *Etheostoma nebra*, Near and Thomas 2015), others becoming extirpated, and several other species recognized, but waiting formal description. By our count, Kentucky has 241 described, native fish species, and about 20 additional, nonnative species established or maintained by repeated stockings. Approximately one-third of the native fauna is considered imperiled or extinct, and warrants a special conservation status in the state (KSNPC 2015). The monitoring, management, and conservation of the fishes is an arduous task requiring current data to provide the most relevant information for resource management. However, no formal fish distributional updates have been published since Compton et al. (2004). Burr and Warren (1986) was the first comprehensive work on the distribution and status of Kentucky fishes, with several subsequent supporting efforts (Burr et al. 1990, Warren et al. 1991, Cicerello and Laudermilk 1996, Ryon and Carrico 1998, Compton et al. 2004). Continuing with these works, the presence of one fish species newly documented, three species “rediscovered” that were previously considered extirpated, and substantial range extensions for 11 other species are reported for Kentucky.

MATERIALS AND METHODS

Distributional records are based on collections made during the past 15 years by the authors, personnel from the Kentucky Department for Environmental Protection (KDPEP), or Kentucky Department of Fish and Wildlife Resources (KDFWR), unless otherwise noted. Fishes were collected by seining, backpack electrofishing, or tote-barge electrofishing, with a few exceptions. All specimens of the parasitic lamprey species were collected by boat electrofishing primarily during the spring (March-June). Cavefishes were collected in subterranean habitats using small, hand-held bait nets following Niemiller and Fitzpatrick (2013). Species were identified with the aid of various guides (e.g., Pflieger 1997, Etnier and Starnes 1993, Page and Burr 2011). Voucher specimens for most of the species reported are housed at Morehead State University (MOSU). Other material is deposited at Austin Peay State University (APSU), Auburn University Natural History Museum (AUM), Southern Illinois University, Carbondale (SIUC), Tennessee Aquarium Conservation Institute (TNACI), University of Michigan Museum of Zoology (UMMZ), National Museum of Natural History (USNM), or Yale University, Peabody Museum of Natural History (YPM ICH). Some

specimens (MRT collections and DOW collections) submitted to SIUC as uncatalogued material are now in transition to INHS. All scientific and common names follow Page et al. (2013), except we recognize *Campostoma anomalum pullum* at species rank following recommendations by Blum et al. (2008), and we follow Near et al. (2011) in treating *Nothonotus* as a genus. Our provisional use of Central Stoneroller as the common name of *C. pullum* follows Pflieger (1997) and Scharpf (2018). Species records are organized by drainage, then county and include locality and date, followed, in parentheses, by collection numbers, the number of specimens, and standard length (SL) or total length (TL) range (when available).

RESULTS

Chestnut Lamprey

Ichthyomyzon castaneus Girard

Green R. drainage: Adair Co.: **1.** Russell Cr., Gentry Mill Road crossing, 26 Jun 2012 (MOSU 3425: 2, 137-150 mm TL); Warren Co.: **2.** Barren R., State Park Pedestrian Bridge, Bowling Green, 28 Mar 2013 (MOSU 3424, 7, 121-191 mm TL); **3.** Gasper R. 1.1 km downstream of Neils Cr. confluence, 23 Apr 2013 (MOSU 3416: 1, 174 mm TL); **4.** Barren R. below Bowling Green Municipal Utilities Dam, 1 Apr 2014 (MOSU 3429: 9, 132-178 mm TL); **5.** Barren R., Lock and Dam #1 tailwaters, near Greencastle, 2 Apr 2014 (MOSU 3417: 3, 150-307 mm TL).

Salt R. drainage: Marion Co.: **1.** Rolling Fk. near Raywick, 6 May 2014 (MOSU 3418: 1, 254 mm TL); Nelson Co.: **2.** Rolling Fk. near Howardstown, 7 May 2014 (MOSU 3419: 1, 195 mm TL).

Remarks: These are the first records of *I. castaneus* from the upper Green River drainage and from the Salt River drainage (Table 1 and Figure 1). This parasitic species is sporadically distributed in the western half of the state, with previous records from the Mississippi, lower Ohio, Cumberland, and lower Green rivers (Burr and Warren 1986). In the Green River drainage, this species has a parapatric distribution with the Ohio Lamprey, *Ichthyomyzon bdellium* (Jordan); *I. bdellium* occupies the upper Green River mainstem from Edmonson to Adair counties and the Drakes Creek system, while *I. castaneus* occupies Russell Creek, Barren River, Gasper River, and the Green River drainage below the mouth of Barren River (MOSU specimens and Burr and Warren 1986). All reported individuals are transformed subadults and adults. Myomere counts from reported *I. castaneus* were 50-56 (usually 52-55), while myomere counts made from 49 Kentucky *I. bdellium* (including 23 Green River drainage specimens) were 54-61 (usually 57-59). These new records of *I. castaneus* substantially increase the known range of this species

Table 1. List of Kentucky fish species with newly reported distribution records. Letters represent regional subunits depicted in Figure 1.

Species	Common Name	Region	Drainage or system (# of new locality records)
<i>Ichthyomyzon castaneus</i>	Chestnut Lamprey	F, G	upper Green R. (1), Salt R. (2), Barren R. (4)
<i>Ichthyomyzon gagei</i>	Southern Brook Lamprey	C	West Fork Clarks R. (1)
<i>Ichthyomyzon unicuspis</i>	Silver Lamprey	G, L	Salt R. (1), Big Sandy R. (1)
<i>Campostoma pullum</i>	Central Stoneroller	C	Tennessee R. (1)
<i>Hemitremia flammea</i>	Flame Chub	D, F	lower Cumberland R. (5), Green R. (2)
<i>Hybopsis amnis</i>	Pallid Shiner	H	Big South Fork Cumberland R. (1)
<i>Notropis dorsalis</i>	Bigmouth Shiner	A	Mayfield Cr. (2)
<i>Notropis maculatus</i>	Taillight Shiner	A, C	Mississippi R. (5), Running Slough (1), Obion Cr. (4), Mayfield Cr. (1), Ohio R. (2), Clarks R. (2)
<i>Umbra limi</i>	Central Mudminnow	A	Obion Cr. (8)
<i>Typhlichthys subterraneus</i>	Southern Cavefish	D, H	lower Cumberland R. (1), upper Cumberland R. (4)
<i>Lepomis marginatus</i>	Dollar Sunfish	C	Blood R. (1)
<i>Ammocrypta pellucida</i>	Eastern Sand Darter	L	Tygart's Cr. (2)
<i>Nothonotus camurus</i>	Bluebreast Darter	L	Kinniconick Cr. (4)
<i>Percina sciera</i>	Dusky Darter	G	Salt R. (1)
<i>Percina squamata</i>	Olive Darter	H	Laurel R. (1)

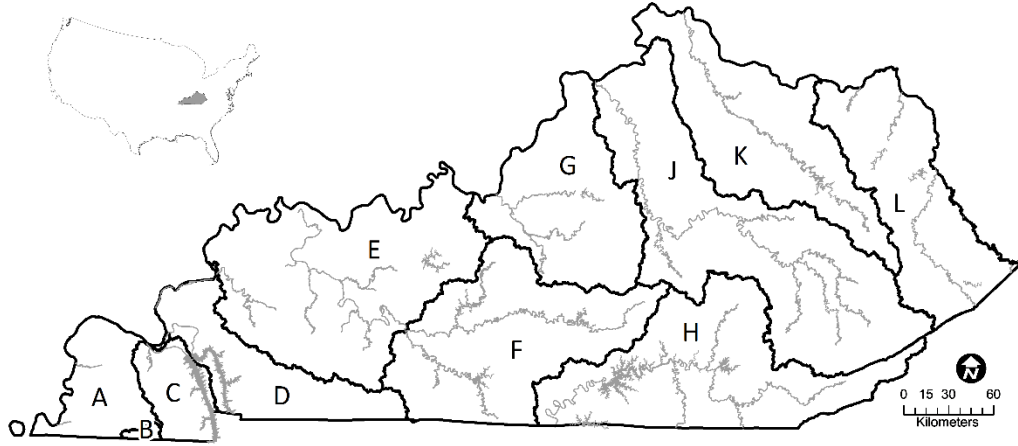


Figure 1. Divisions of major drainages or ichthyofaunal regions as they relate to fish distribution patterns. A) lower Ohio River tributaries, Mayfield and Obion creeks and Bayou de Chien. B) Terrapin Creek and other small tributaries of the Obion River. C) lower Tennessee and Clarks rivers. D) lower Cumberland River. E) Tradewater and lower Green rivers. F) upper Green and Barren rivers. G) Salt River. H) upper Cumberland River. J) Kentucky River. K) Licking River. L) Kinniconick and Tygart's creeks, Little Sandy and Big Sandy rivers. Figure modified from Burr (1980).

in Kentucky. It is a species of special concern (KSNPC 2015) and of greatest conservation need (KDFWR 2013) in the state.

Southern Brook Lamprey
Ichthyomyzon gagei Hubbs and Trautman

Tennessee R. drainage: Graves Co.: **1**. Panther Cr. at KY 2580, 19 May 2015 (MOSU 2755: 3, 135-150 mm TL).

Remarks: This is the second record of *Ichthyomyzon gagei* from Kentucky. The only other reported record is a single specimen collected in 1971 from the West Fork Clarks River in Calloway County (Burr and Mayden 1979). This nonparasitic species occurs in tributaries to the lower Mississippi River and the Gulf Coast drainage and infrequently in tributaries to the Tennessee River. A disjunct population exists in St. Croix River tributaries in Minnesota and Wisconsin. It is secure throughout most of its range (NatureServe 2018), but listed as extirpated in Kentucky (KSNPC 2015).

This 2015 record consisted of two adults and one ammocoete. The ammocoete could not be positively identified as *I. gagei*; its myomere count (51) is also consistent with *I. castaneus*, but there are no verified records of *I. castaneus* in the Clarks River drainage. The year prior, an *Ichthyomyzon* ammocoete was collected from the same site (JJC, pers. ob.). Based on the adult records and the two consecutive ammocoete collections, a reproducing population of *I. gagei* appears to be present in Panther Creek. This species should be considered endangered in Kentucky.

Silver Lamprey
Ichthyomyzon unicuspis Hubbs and Trautman

Salt R. drainage: Hardin Co.: **1**. Salt R. 0.5 km upstream of mouth, at West Point, 9 Sep 2015 (MOSU 3428: 1, 203 mm TL).

Big Sandy R. drainage: Pike Co.: **1**. Hambley Lake of Levisa Fk., Pikeville, 26 Apr 2011 (MOSU 3431: 1, 129 mm TL).

Remarks: These are the first records of *I. unicuspis* from the Salt River and upper Big Sandy River drainages. The only other *I. unicuspis* records from the Big Sandy River drainage are from Blaine Creek in Lawrence County (Burr and Warren 1986). Both specimens are transformed subadults or adults. This parasitic species

continues to be encountered with some regularity in the Ohio River, but rare elsewhere in Kentucky (Burr and Warren 1986, Compton et al. 2004).

Central Stoneroller

Campostoma pullum (Agassiz)

Tennessee R. drainage: Livingston Co.: **1.** Gum Spring Br. at Gum Spring, KY 453, 19 May 2012 (MOSU 2629: 5, 80-95 mm SL).

Remarks: This is the first record of *C. pullum* from the Tennessee River drainage, and the most eastern record in Kentucky. This species usually has been treated as a subspecies of *C. anomalum*. However, Kentucky *C. anomalum* (occurring in eastern half of the state) and *C. pullum* (extreme west of the state) are morphologically distinct. *Campostoma pullum* was recognized as a distinct species by Etnier and Starnes (1993) and Pflieger (1997), a decision supported by subsequent phylogenetic analysis of mtDNA (Blum et al. 2008). Morphological characters of the Gum Spring specimens are consistent with those of *C. pullum*: internasal tubercles present, a dark anal-fin band; 4-4 pharyngeal teeth, 16-18 pectoral rays, and 18-19 scales above the lateral line (Etnier and Starnes 1993). Other records for *C. pullum* in Kentucky are available from direct tributaries of the Mississippi and Ohio rivers in Carlisle, Ballard, McCracken, and Graves counties (Burr and Warren 1986). *Campostoma oligolepis* is reported widespread in the lower Tennessee River drainage (Burr and Warren 1986), but given the difficulty of identifying non-breeding stonerollers, it seems possible that some lower Tennessee drainage records of *C. oligolepis* are actually *C. pullum*. No *C. oligolepis* were encountered with *C. pullum* in Gum Springs Branch, and its occurrence within the stream is unknown.

Flame Chub

Hemitremia flammea (Jordan and Gilbert)

Cumberland R. drainage: Simpson Co.: **1.** Spring Cr. at KY 103 crossing, 19 Aug 2011 (MRT 11-45: 5, 48-66 mm TL); **2.** Spring Cr. at KY 1170 crossing, 4 May 2012 (APSU 4901: 4, 46-50 mm TL); **3.** Spring Cr. at Young Rd. crossing NW of Robey Swamp, 4 May 2012 (APSU 4916: 1, 48 mm TL); **4.** Spring Cr., Mennonite Rd., 18 May 2012 (MOSU 2617: 2, 42-44 mm SL); **5.** Sulphur Spring Cr. off Neosho Rd., 0.6 km S of KY 100/Neosho Rd. jct., 14 May 2013 (MRT 13-46: 14, photographed, not retained).

Green R. drainage: Simpson Co.: **1.** Sinking Cr. at Mary Adams Rd. crossing, 25 Apr 2013 (MRT 13-40: 19, photographed, not retained); **2.** Sinking Cr. at Robey-Bethel Grove Rd. crossing, 25 Apr 2013 (APSU 4992: 37, 39-56 mm SL).

Remarks: *Hemitremia flammea* had not been reported from Kentucky since the late 1880s and was presumed extirpated in Kentucky (Burr and Warren 1986, KSNPC 2012). The only historical Kentucky records are from the upper Cumberland River drainage (Burr and Warren 1986). It was reported to be abundant in the Laurel River, Laurel County (Jordan and Brayton 1878), but the exact location of the collection is uncertain. A single specimen identified as *H. flammea* is available (USNM 101177) from Jordan's Laurel River collection; however, the specimen is desiccated and positive identification is impossible (Burr and Warren 1986, MRT pers. obs.). Jordan and Swain (1883) also reported collecting the species from Clear Fork and Wolf Creek, Whitley County, but expressed doubt about the accuracy of their identification and no voucher specimens are available for verification. Because Jordan collected *H. flammea* from other localities throughout its range, many of which were verified, these early Kentucky records were accepted as valid by Burr and Warren (1986). Despite hundreds of fish surveys in the upper Cumberland River drainage and repeated collecting efforts from historical locations (Thomas and Brandt 2015, 2016a), the species has not been encountered in the upper Cumberland River drainage since Jordan and Swain (1883).

In 2011, *H. flammea* was collected in Spring Creek, a small spring-fed tributary of the upper Red River in the lower Cumberland River drainage of southwestern Kentucky. It has since been collected from seven locations in three spring-fed stream systems, all of which emanate from Robey Swamp, a remnant wetland in northwestern Simpson County (Thomas and Brandt 2017a). These records represent a new population and northern extension of the known range of the species, most of which is in the Tennessee River drainage of Tennessee and small portions of northern Alabama and Georgia. The population in the Red River (Lower Cumberland River) and Drakes Creek (Green River) systems is far removed from other known populations in the Cumberland River drainage in Tennessee; the closest being the Caney Fork River system. Despite the apparent isolation of the Red River system population, genetic divergence was shallow and recognition of management units for conservation was not merited (Alford 2013). As with other fishes associated with spring habitats, *H. flammea* is particularly sensitive to habitat alterations that result in degradation of groundwater quality (Butler 2002, Stallsmith 2010). Because of its isolation, extirpation from the upper Cumberland River drainage, and vulnerability to habitat loss, it is recommended that this species be provided endangered status in Kentucky.

Pallid Shiner

Hybopsis amnis (Hubbs and Greene)

Cumberland R. drainage: McCreary Co.: **1.** Big South Fork Cumberland R. at Blue Heron canoe access, 24 Aug 2005 (SIUC 61635: 18, 62 mm TL, photographed).

Remarks: This species was collected for the first time in the Big South Fork Cumberland River in 2005. It had been considered extirpated from Kentucky (KSNPC 2005). Only six other records are known within the state, the last of which was from Wolf Lick Creek (Green River drainage), Logan County, in 1970 (Burr and Warren 1986). In the Big South Fork, specimens were collected along with morphologically similar Bigeye Chub, *Hybopsis amblops*, and eight other cyprinid species. These individuals were collected in gentle current at depths ranging from 30-75 cm near water willow (*Justicia* sp.). Substrates were a mixture of sand, gravel, pebble, and cobble, with minimal siltation. *Hybopsis amnis* exhibits a sporadic distribution and has experienced considerable declines, particularly in the northern extent of its range (Pfleiger 1997, Page and Burr 2011). The species has not been detected during subsequent collecting efforts in the Big South Fork and elsewhere in Kentucky. It is currently considered endangered in Kentucky (KSNPC 2015) and is a species of greatest conservation need (KDFWR 2013).

Bigmouth Shiner

Notropis dorsalis (Agassiz)

Mayfield Cr. drainage: Ballard Co.: **1.** Stovall Cr. 0.16 km above Bethlehem Road bridge, 30 May 2009 (DOW 07002006 1, not measured); Carlisle Co.: **2.** West Fork of Mayfield Cr., CR 1101 W of Kirbyton, 12 Aug 2015 (MOSU 2753: 11, 26-52 mm SL).

Remarks: These are the first records of this species in Kentucky. This minnow typically occurs in pool habitat from small low gradient streams in the upper Midwest, but occasionally is encountered in the Mississippi River mainstem in southern Illinois (DJE, pers. obs.). The species occupied Bear Creek in western Tennessee in the late 1980s (Etnier and Starnes 1993). The occurrence of *N. dorsalis* from multiple Coastal Plain streams in Kentucky and Tennessee indicates that transient or waif individuals occur within the Mississippi River mainstem more frequently than reported.

We consider *N. dorsalis* a native Kentucky species, because it apparently naturally colonized Kentucky waters from native populations from adjacent states.

We suspect Mayfield Creek was colonized by individuals that moved downstream through the Mississippi River, an explanation also invoked by Etnier and Starnes (1993) for the Bear Creek individuals. Multiple collections spanning six years, with one collection containing multiple size classes, indicate that a reproducing population is established in the Mayfield Creek system. It is possible *N. dorsalis* was overlooked from previous surveys within Mayfield Creek, potentially misidentified as another cyprinid (e.g., Sand Shiner, *N. stramineus*) in the field. Additional surveys are needed within the Coastal Plain region to determine the exact range and persistence of the species in the state. We recommend a status of “special concern” for this species until further information is acquired.

Taillight Shiner

Notropis maculatus (Hay)

Obion R. drainage: Fulton Co.: **1.** Hamby Pond, 3.4 km upstream of Running Slough, 22 May 2008 (MRT 08-25: 5, 58 mm TL photographed).

Obion Cr. drainage: Hickman Co.: **1.** Three Ponds, 2.3 km SW of Hailwell, 22 Sep 2009 (MRT 09-56: 47, 29-47 mm TL); **2.** Cypress Cr. at KY 307 crossing, 23 Sep 2009 (MRT 09-59: 120, 21-45 mm TL); **3.** Bayou de Chien at KY 239, 6 Oct 2016 (MOSU 2777: 5, 25-35 mm SL); **4.** unnamed slough of Obion Cr., 2 km S of where KY 307 crosses Obion Cr., 7 Oct 2016 (MOSU 3400: 2, 36 mm SL).

Mayfield Cr. drainage: Ballard Co.: **1.** Mayfield Cr. 1 km upstream of KY 121 crossing, 26 May 2005 (SIUC 76958: 43, 32-56 mm TL).

Minor Mississippi R. tributaries: Ballard Co.: **1.** Fish Lake outflow, Fish Lake Rd., 4 km W of Barlow, 24 Sep 2009 (MRT 09-61: 49, 32-51 mm TL); **2.** Minor Slough, First Lake outflow in Boatwright Wildlife Management Area, 1 Aug 2016 (APSU 5340: 1, 30 mm TL); **3.** Deep Slough, Swan Lake Rd. crossing NE of Long Pond in Boatwright Wildlife Management Area, 23 Aug 2016 (APSU 5337: 138, 18-60 mm TL); **4.** Burnt Pond at end of Swan Lake Rd. in Boatwright Wildlife Management Area, 23 Aug 2016 (APSU 5338: 159, 18-44 mm TL); **5.** Clear Lake outflow at KY 118 crossing in Ballard Wildlife Management Area, 24 Aug 2016 (APSU 5339: 29, 24-36 mm TL).

Minor Ohio R. tributaries: Ballard Co.: **1.** Goose Pond, Oscar Bottoms in Ballard Wildlife Management Area, 12 Oct 2017 (MOSU 3461: 68, 35-48 mm TL); **2.**

Butler Lake/Lake Slough at Mitchell Lake Rd. crossing in Ballard Wildlife Management Area, 12 Oct 2017 (MOSU 3487: 4, 40-46 mm TL).

Tennessee R. drainage: Marshall Co.: **1.** Clarks R. Refuge pond, off US 641, 2.4 km N of Benton, 15 Sep 2015 (MOSU 3488: 1, mm 36 TL); **2.** same location as MOSU 3488, 13 Sep 2016 (MOSU 3489: 1, 44 mm TL).

Remarks: This documents the persistence of *N. maculatus* in Obion Creek and the Clarks River system, only recently reported from these areas (Compton et al. 2004). Specimens captured in the Clarks River during 2015-2016 expand its known distribution in the Clarks River drainage and represent the easternmost occurrence of the species in the Mississippi River basin. The Bayou de Chien record is the first since 1890; that collection (UMMZ 205320) is from the same locality as the present one (Woolman 1892). Numerous new locality records from Ballard County indicate this species is more common there than previously documented (Burr and Warren 1986). The new records are from shallow, natural lakes, sloughs, and side channels of larger streams, often containing considerable coarse woody debris, and living buttonbush (*Cephalanthus occidentalis*) and bald cypress (*Taxodium distichum*). This habitat can be quite difficult to sample by seining or backpack electrofishing, explaining the absence of this species in previous surveys. This species currently is considered threatened in Kentucky (KSNPC 2015) and a species of greatest conservation need (KDFWR 2013). Given the recent documentation of extant populations in the Obion Creek and Clarks River drainages, along with persistence of high-density populations in the Ohio and Mississippi river lowlands of Ballard County, we suggest the status of *N. maculatus* be changed to “special concern.”

Central Mudminnow
Umbra limi (Kirtland)

Obion Cr. drainage: Fulton Co.: **1.** Little Bayou de Chien at KY 1907 crossing, 20 May 2009 (MOSU 3490: 3, 28-64 mm SL); **2.** Little Bayou de Chien 0.25 km above KY 1125 bridge crossing, 18 October 2017 (MCC 17-LBDC2: 1, photographed, not retained); Hickman Co.: **3.** Bayou de Chien 4.8 km SW of Fulgham, 19 Apr 1986 (INHS 61770: 1, not measured); **4.** Obion Cr. at southernmost crossing of US 51, 2 Apr 1998 (SIUC 56545: 1, not measured); **5.** Murphy Pond and surrounding wetlands off Henderson Road, 25 Apr 2007 (MRT 07-48: 5, not measured); **6.** Obion Cr. above KY 307 crossing, 24 Jul 2007 (MRT 07-49: 5, not measured); **7.** Little Joe Cr. at KY 307 crossing, 3 Jun 2010 (MRT 10-19: 4, not measured); **8.** unnamed pond along Obion Cr. at KY 58 crossing of Obion Cr., 26 May 2013 (MOSU 2659: 4, 40-43 mm SL).

Remarks: *Umbra limi* occurs in the Blood and Clarks rivers of the Tennessee River drainage and in the Running Slough and Terrapin Creek systems of the Obion River drainage in Kentucky (Burr and Warren 1986, Etnier and Starnes 1993; Thomas and Brandt 2016b, 2017b). We report for the first time multiple *U. limi* records, spanning over thirty years, from the Obion Creek drainage (not part of the Obion River drainage). The species was first collected from the Obion Creek drainage in Bayou de Chien in 1986, with another record from Obion Creek in 1998. In recent years, however, surveys in the Obion Creek drainage have resulted in several additional records. These records indicate the species might have been missed in prior surveys or that it has become more common recently, because habitat conditions for the species have stabilized and improved since earlier destructive agricultural practices. Specimens were collected in moderately shallow (up to 1 m deep) ponds, sloughs, temporary wetlands, and small streams, usually near dense herbaceous vegetation and shrubs. *Umbra limi* is considered threatened in Kentucky (KSNPC 2015) and a species of greatest conservation need (KDFWR 2013).

Southern Cavefish

Typhlichthys subterraneus Girard

Cumberland R. drainage: Pulaski Co.: **1.** Well's Cave, 27 Apr 2008 (AUM 57000: 1, 38 mm SL); **2.** Drowned Rat Cave, 2 Aug 2008 (AUM 57011: 4, 25-36 mm SL); **3.** same location as AUM 57011, 22 Apr 2012 (YPM ICH 025293: 2, 27-46 mm SL); **4.** Dave's Cave, 7 Jul 2012 (YPM ICH 025338: 3, 24-34 mm SL); Simpson Co.: **5.** Webb Cave, 30 Jun 2010 (YPM ICH 025307: 3, 25-46 mm SL);

Remarks: In Kentucky, *Typhlichthys subterraneus* is sporadic and generally uncommon in cave systems in the Green and Cumberland river drainages; most occurrences are known from the Mammoth Cave region of the Interior Plateau in Barren, Edmonson, Hart, and Warren counties (Burr and Warren 1986, Niemiller and Fitzpatrick 2013). Outside of this region, single records are available for Trigg County (Rice et al. 1983) and Pulaski County (Cooper and Beiter 1972). Recent surveys for amblyopsid cavefishes in Kentucky by Matthew Niemiller (University of Alabama in Huntsville (UAH)) revealed a previously undocumented occurrence of *T. subterraneus* in the Red River (lower Cumberland River) system in Simpson County (Niemiller and Fitzpatrick 2013).

In the Upper Cumberland-Lake Cumberland drainage on the Cumberland Plateau escarpment, *Typhlichthys subterraneus* was collected from Sloans River Cave, Pulaski County, in 1969 (Cooper and Beiter 1972), with additional observations of cavefish there in the 1990s and early 2000s (M. Niemiller, pers.

comm.). In 2008-2012, specimens were collected from three caves near Sloans River Cave: Well's Cave, Dave's Cave, and Drowned Rat Cave along Buck Creek in southern Pulaski County (Niemiller and Fitzpatrick 2013). *Typhlichthys subterraneus* is considered vulnerable throughout its range (Jelks et al. 2008). In Kentucky, it is listed as a species of special concern (KSNPC 2015) and species of greatest conservation need (KDFWR 2013). Genetic data suggest Cumberland Plateau populations represent an undescribed species of *Typhlichthys* (Niemiller et al. 2013). Niemiller and Fitzpatrick (2013) recommended state endangered status for the undescribed species ("Kentucky Cavefish") because of the small number of occurrences, few individuals observed, and potential threats, which include hydrological changes associated with Lake Cumberland.

Dollar Sunfish

Lepomis marginatus (Holbrook)

Tennessee R. drainage: Calloway Co.: **1.** Unnamed tributary of Blood R. at Osborne Rd., 600 m above KY-TN line, 22 Apr 2015 (MOSU 3480: 5, 57-63 mm SL).

Remarks: In Kentucky, *Lepomis marginatus* is restricted to the Jackson Purchase region where it inhabits spring-fed wetlands, sluggish streams, and sloughs (Burr and Warren 1986). The species is currently known from Murphy Pond, Hickman Co.; Terrapin Creek, Graves Co.; and the Clarks River system, Graves and Marshall cos. (Burr and Warren 1986, Thomas and Brandt 2016b). *Lepomis marginatus* previously was unknown from the Blood River system of Kentucky and Tennessee (Burr and Warren 1986, Etnier and Starnes 1993). The collection reported herein represents the first record for that system. Specimens were collected in a small, first-order stream (1 km² drainage area) with a narrow (2-4 m) channel, sluggish current, soft mud substrate, and an abundance of woody debris and emergent vegetation. Of 32 sites sampled in the Blood River drainage in Kentucky during 2014-2016, this was the only site where *L. marginatus* was collected (Thomas and Brandt 2017b). The Longear Sunfish, *Lepomis megalotis*, which is similar and closely related to *L. marginatus*, was collected at seven sites in the Blood River system, but was not found to be syntopic with *L. marginatus*. *Lepomis marginatus* is considered endangered in Kentucky (KSNPC 2015) and a species of greatest conservation need (KDFWR 2013).

Eastern Sand Darter

Ammocrypta pellucida (Putnam)

Tygart's Cr. drainage: Greenup Co.: **1.** Tygart's Cr. at Bennetts Mill Covered Bridge, East Tygart's Rd., 2 Jun 2015 (MOSU 2723: 1, 39 mm SL); **2.** Tygart's Cr. at mouth of Brushy Creek, 13 Aug 2015 (MOSU 2734: 1, 46 mm SL).

Remarks: These are the first records of *A. pellucida* from the Tygart's Creek drainage. Both specimens were captured in slow current, about 0.8 m deep, over sand and fine gravel. This habitat is not widespread in Tygart's Creek, occurring locally in Tygart's Creek in the southern half of Greenup County. Elsewhere in Kentucky, *A. pellucida* is locally distributed in large creeks and rivers from the Green River eastward to the Big Sandy River drainage. However, substantiated contemporary records from the Green River are lacking. This sensitive species was considered of "special concern" in Kentucky (KSNPC 2010), although currently receives no conservation designation (KSNPC 2015).

Bluebreast Darter

Nothonotus camurus (Cope)

Kinniconick Cr. drainage: Lewis Co.: **1.** Kinniconick Cr. 600 m below mouth of Anderson Branch, 26 Jul 2008 (MOSU 2413: 1, 40 mm SL); **2.** Kinniconick Cr. 700 m below mouth of Trace Branch, 29 Jul 2008 (MOSU 2417: 5, 38-49 mm SL); **3.** Kinniconick Cr. 500 m below mouth of McDowell Creek, 30 Jul 2008 (MOSU 2419: 3, 11-51 mm SL); **4.** Kinniconick Cr. 500 m above mouth of Spy Run, 8 Aug 2008 (MOSU 2425: 8, 35-53 mm SL).

Remarks: These are the first records of *N. camurus* (previously *Etheostoma camurum*) in the Kinniconick Creek drainage. Additional observations by DJE (snorkeling, backpack electrofishing, seining) indicate it is occasional (upper drainage) to common (lower drainage) in fast riffles of this stream from 1 km below KY 10 upstream to 200 m above Grassy Branch. This species is generally regarded as intolerant of siltation and hydrologic changes (Etnier and Starnes 1993), and has declined in many states (NatureServe 2018). In Kentucky, it is locally common in large streams in the Licking, Kentucky, and Cumberland river drainages (Burr and Warren 1986).

Dusky Darter

Percina sciera (Swain)

Salt R. drainage: Bullitt Co.: **1.** Salt R. near KY 61 bridge, 25 Sep 2014 (MOSU 2754: 3, 55-72 mm SL).

Remarks: This is the first record of *Percina sciera* from the Salt River drainage. Five (two were released) specimens were captured in 2014. The species is common to sporadic throughout Kentucky except for the Salt and Licking river drainages, where there were no previously reported records. It also occurs rarely throughout the Ohio River, mostly near tributaries. No records in the Ohio River exist between river kilometer 694 and 1159, where the Salt and Licking rivers empty into the mainstem, respectively (J. Thomas, Ohio River Valley Water Sanitation Commission (ORSANCO), pers. comm.).

Olive Darter

Percina squamata (Gilbert and Swain)

Cumberland R. drainage: Whitley Co.: **1.** Laurel R. at mouth of Spruce Creek, 23 Aug 1961 (SIUC 64337: ex KFW 1513; 1, 90 mm SL).

Remarks: In Kentucky, *Percina squamata* has a limited distribution in the middle Cumberland River drainage below Cumberland Falls, where it occurs only in the Rockcastle River and Big South Fork (Burr and Warren 1986). During the transfer of the KDFWR fish collection (KFW) to SIUC, a single specimen of *P. squamata* was discovered in a collection made by William Turner, from the Laurel River, on 23 August 1961. The collection was made near the mouth of Spruce Creek, which is now inundated by Laurel River Lake. This is the only location where vouchered specimens represent a record of the historical fish community of the lower Laurel River prior to impoundment. *Percina squamata* often is associated with cobble and boulder substrates within or adjacent to swift current (Burr and Warren 1986, Etnier and Starnes 1993). Presumably, this habitat would have been present in the lower Laurel River system along the Pottsville Escarpment of the Cumberland Plateau prior to impoundment, but only short sections of this habitat remain in lower Spruce Creek before it becomes embayed by Laurel River Lake and in the Laurel River between the confluences of Adams Branch and Little Laurel River. Thomas and Brandt (2015) surveyed these and other locations throughout the Laurel River drainage, but did not encounter *P. squamata*. The species is considered vulnerable throughout its range (Jelks et al. 2008). In Kentucky, it is listed as endangered (KSNPC 2015) and a species of greatest conservation need (KDFWR 2013).

DISCUSSION

Fish collecting efforts during the past 15 years have resulted in new records for fishes in 7 of 11 ichthyofauna regions in Kentucky identified by Burr (1980) (Figure 1 and Table 1). Of the 15 species listed in Table 1, *P. squamata* is the only one for which a new drainage record resulted from a previously unreported museum specimen. Records for the remaining 14 species resulted from incidental capture during routine fish sampling of drainages, surveys targeting particular species, or from general collecting in poorly sampled areas. Over 30% of fishes having a special conservation status in Kentucky are either entirely distributed or have a large portion of their distributions west of the Green River basin; however, available records for many of these species were more than 15 years old. Nearly half of the species reported here were collected in the Jackson Purchase area of western Kentucky (regions A and C; Figure 1 and Table 1).

Increased surveillance using multiple sampling techniques have refined distributions of species that are difficult to collect due to their behavior and habitat affinity. Determining the actual distributions and population sizes of amblyopsid cavefishes is extremely difficult because of the inaccessibility of subterranean habitats. Access to new caves using specialized gear and sampling methodologies revealed previously undocumented occurrences of *T. subterraneus*, including an undescribed species (Niemiller and Fitzpatrick 2013, Niemiller et al. 2013). The sporadic to uncommon distributions of most lamprey species in Kentucky might partly be attributed to the difficulty of collecting adults in large streams using wadeable stream fish sampling methodologies. Newly reported records of parasitic species (*I. castaneus* and *I. unicuspis*) collected by KDFWR biologists during sportfish sampling in riverine habitats, using pulsed DC electrofishing from a boat-mounted unit, illustrate the importance of sampling with alternative methods and collaboration among professionals from diverse disciplines.

Especially noteworthy is the addition of *N. dorsalis* to Kentucky's native ichthyofauna and rediscovery of three species (*I. gagei*, *H. flammea*, and *H. amnis*) thought to be extirpated from the state. These discoveries and new drainage records for several other species demonstrate the need for surveys targeting previously unsampled locations, along with regular sampling of locations with the potential habitat to support rare fishes. Furthermore, given the dynamic nature of Kentucky's fishes in response to a changing landscape, we urge continued survey efforts for fishes across all habitats to provide resource managers with the most current and accurate distributional and habitat information. It is with these data that informed resource management and conservation decisions can be made for the state's aquatic resources.

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