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First Occurrence of the Streamline Chub, *Erimystax dissimilis,* and Tippecanoe Darter, *Nothonotus tippecanoe,* in Illinois and within the Vermilion River Basin (Wabash River Drainage)

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ABSTRACT

Neither the Streamline Chub, *Erimystax dissimilis*, nor Tippecanoe Darter, *Nothonotus tippecanoe*, have been documented in Illinois or in the Vermilion River (Wabash River drainage) in Indiana. We report the first occurrences of both species in the Vermilion River, in addition to the state of Illinois. As with several other recent range expansions of rare fishes, our discovery should indicate improved physicochemical conditions in the Vermilion River basin. With the addition of *E. dissimilis* and *N. tippecanoe* to the state faunal list, 194 species of native fish are now recognized in Illinois.

INTRODUCTION

The Streamline Chub, *Erimystax dissimilis* (family Leuciscidae), is a somewhat large minnow (<140 mm TL) that sporadically occurs in the Ohio River basin from western New York to northern Indiana and south to northern Alabama (Harris 1986; Strange and Burr 1997; Page and Burr 2011). It commonly inhabits deep (>0.25 m), swift flowing waters over clean rocky substrates (Rice and Zimmerman 2019). *Erimystax dissimilis* disappeared from much of its original range, likely due to increased siltation and turbidity, and is now generally uncommon and localized when found (Trautman 1981; Stauffer et al. 2016). The minnow has disjunct, but stable populations throughout the Wabash River drainage in Indiana – inhabiting the mainstem Wabash River, Tippecanoe River, the lower part of several other tributaries within the upper Wabash River from Wildcat Creek to the Eel River, and the mainstem East Fork White River and several tributaries of the upper part of that basin; it also occurs in the Blue River, a direct tributary to the Ohio River in south-central Indiana. The minnow is not considered a Species of Greatest Conservation Need in Indiana.

The Tippecanoe Darter, *Nothonotus tippecanoe* (formerly *Etheostoma tippecanoe*; see Near et al. 2011) (family Percidae), is a small (<45 mm TL), benthic fish that sporadically occurs in the Ohio River basin from Pennsylvania to Indiana and south to the Cumberland River drainage in Tennessee (Kinziger et al. 2001; Page and Burr 2011; Honick et al. 2017). It is often found in areas of moderate to fast current in loose, unconsolidated gravel and cobble (Fisher 2008). Because it lives in the interstitial spaces among rocks, the darter is intolerant of silted and embedded substrates (Rice and Zimmerman 2019). The American Fisheries Society (i.e., Jelks et al. 2008) considered *N. tippecanoe* as Vulnerable, which is a species that is "in imminent danger of becoming threatened throughout all or a significant portion of its range." *Nothonotus tippecanoe* has disjunct, but stable and expanding populations throughout the Wabash River drainage in Indiana – inhabiting the mainstem Wabash River, Tippecanoe River, the lower part of several other tributaries within the upper Wabash River from Wildcat Creek to the Little River, and in the lower East Fork White River (Fisher 2008). The darter was recently delisted as a Species of Greatest Conservation Need in Indiana.

To our knowledge, neither *E. dissimilis* nor *N. tippecanoe* have been reported in the Vermilion River basin (Wabash River drainage) or in the state of Illinois (Smith 1979). We report the first occurrences of *E. dissimilis* and *N. tippecanoe* in the Vermilion River, including the first verified documentation in Illinois.

METHODS

We were alerted to the possible presence of *N. tippecanoe* in the lower Vermilion River in Indiana by a micro-fisherperson, who observed the darter while angling. Therefore, we sampled the lower Vermilion River basin from near its confluence with the Wabash River in Vermillion County, Indiana, upstream to the lower North Fork, Middle Fork, and Salt Fork in Vermilion County, Illinois, on 14 and 18 September 2020 (Figure 1). During these samples, we exclusively focused on riffles and only implemented the kick-seining method, which is a useful technique when sampling diminutive, benthic fishes (Fisher 2008; Tiemann 2008; Tiemann et al. 2020). Shortly thereafter, one of us (AJ) collected *E. dissimilis* on 7 October 2020 using pulsed DC electrofishing during a routine, post-construction monitoring sample following the demolition of the Danville Dam in Danville, Vermilion County, Illinois. We then resampled the Vermilion River mainstem on

16 October 2020 and 4 November 2020 by pull-seining and kick-seining through swift flowing riffles and runs (Figure 2). Given the imperiled status of *N. tippecanoe* (Jelks et al. 2008), we do not provide site specific locations, but voucher specimens were deposited at the Illinois Natural History Survey (INHS) Fish Collection, Champaign.

RESULTS

We collected *E. dissimilis* in the Vermilion River mainstem from nearly 5 km downstream of the Illinois-Indiana state line upstream to Danville, Vermilion County (Figure 2). The minnow was collected in swift flowing water over clean, rocky substrates and was often collected with the Illinois state-threatened Gravel Chub, *Erimystax x-punctatus*. We collected *N. tippecanoe* from approximately 13 km downstream of the Illinois-Indiana state line upstream to Danville and in the lower North Fork Vermilion River (Figure 1). The darter was collected in rocky riffles and regularly co-occurred with the Illinois state-endangered Bluebreast Darter, *Nothonotus camurus* (formerly *Etheostoma camurum*; see Near et al. 2011). We did not attempt to document density or catch-per-unit-effort of either species; instead, we were interested in trying to determine the range of both species within the basin. It took us at least 30 minutes of sampling to collect the first *E. dissimilis* at all three positive sites and <3 individuals were caught when encountered. However, we collected >10 individuals of *N. tippecanoe* within 5 minutes / 3 kick-sets of sampling at positive sites and ceased collecting when we did not detect the species within approximately 30 minutes of sampling. Of particular interest, we collected *N. tippecanoe* upstream of the former Danville Dam, showing the species' range extends beyond the former barrier; the dam was located on the mainstem Vermilion River in Danville and removed in 2018. Also of note during our surveys was the collection of >100 Shoal Chubs, *Macrhybopsis hyostoma*, at multiple sites. *Macrhybopsis hyostoma* is a species previously reported as extirpated from the Vermilion River basin in Illinois (Retzer 2005).

DISCUSSION

Both *E. dissimilis* and *N. tippecanoe* have disjunct populations in Indiana, with the closest populations to the Vermilion being in the Wabash River mainstem >30 river-miles (>50 river-kilometers) away. This conundrum is like the expansion of Bigeye Chub *Hybopsis amblops* (see Sherwood and Wylie 2015). It is possible colonization into the Vermilion River occurred from the Wabash River in Indiana; however, the preferred habitat (e.g., fast flowing rocky areas) is lacking between the two areas. It seems equally likely that both *E. dissimilis* and *N. tippecanoe* had small, undetected populations somewhere in the lower portion of the Vermilion River basin. The lower Vermilion River has limited public access, and both species typically do not recruit well to traditional large river sampling methodologies (e.g., electrofishing). After our fieldwork, we re-examined darters from the Vermilion River that were accessioned into the INHS Fish Collection. We discovered one misidentified lot (INHS 108933) of *N. tippecanoe* from 2014 from the Vermilion River mainstem near the state

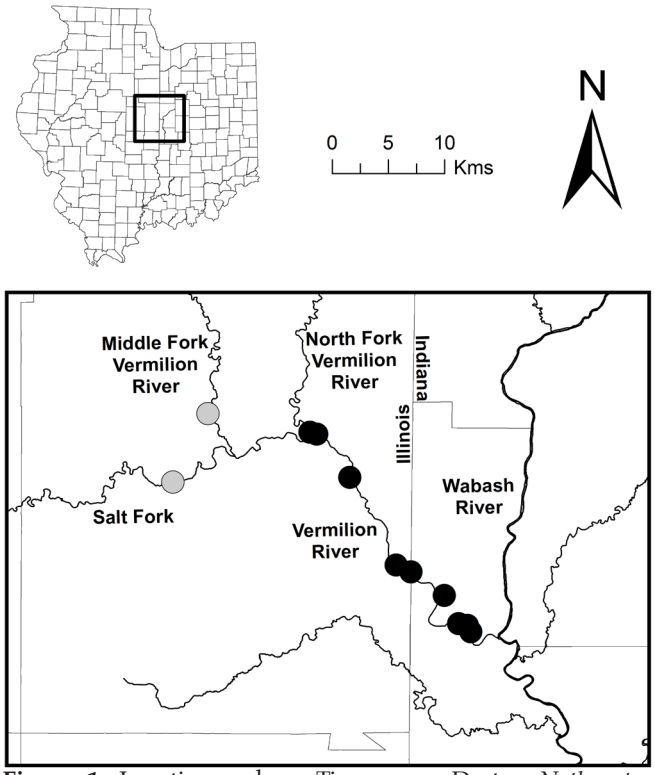

Figure 1. Locations where Tippecanoe Darter, *Nothonotus tippecanoe*, was collected (black circles), and those sites where we did not detect it (gray circles) during our 2020 sampling for the species.

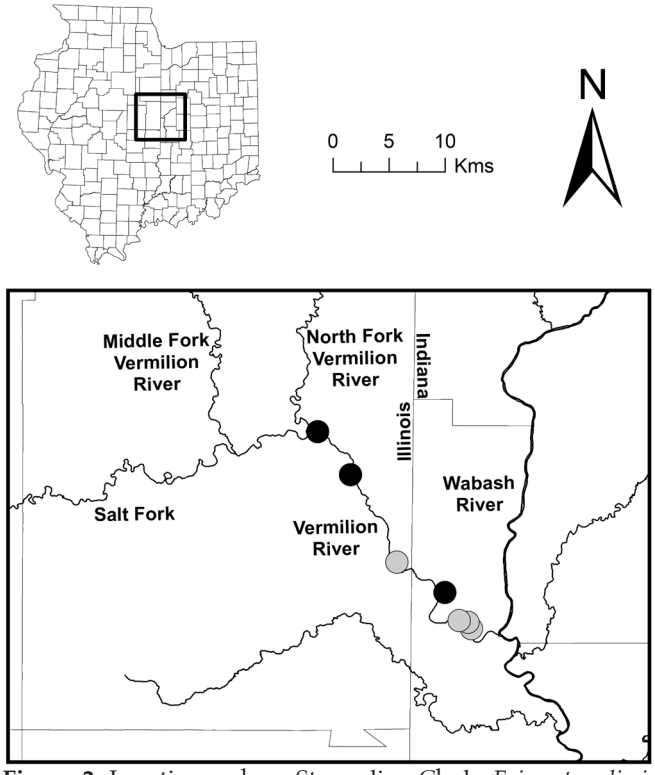

Figure 2. Locations where Streamline Chub, *Erimystax dissimilis*, was collected (black circles), and those sites where we did not detect it (gray circles) during our 2020 sampling for the species.

line, indicating the species was extant in the basin prior to our discovery. The Vermilion River basin has collections dating back more than a century (e.g., Forbes and Richardson 1909), but the lower mainstem is infrequently sampled due to limited access points. The Vermilion River basin experienced anthropogenic disturbances during the past century, including impoundments that fragment habitats, unabated domestic sewage effluent, siltation, and dredging/channelization (Baker 1922; Smith 1968). However, restoration activities, including dam removals, have recently occurred and the physicochemical conditions of the basin have improved (Larimore and Bayley 1996; Tiemann et al. 2016; Smith et al. 2017). Several native fishes – including the Illinois state-endangered *H. amblops* and Illinois state-threatened Eastern Sand Darter, *Ammocrypta pellucida* – have recently expanded their ranges in the Vermilion River basin (Retzer 2005; Sherwood and Wylie 2015; Tiemann et al. 2015; Tiemann et al. 2020). Elsewhere, *E. dissimilis* and *N. tippecanoe* have recently expanded their ranges in the upper Ohio River basin because of improved water quality (Stauffer et al. 2016; Honick et al. 2017; Rice and Zimmerman 2019). Our discovery of *E. dissimilis* and *N. tippecanoe* should suggest the improved physicochemical conditions in the Vermilion River basin have allowed both species, as well as *M. hyostoma*, to increase probability of detection because of population size expansions.

We feel both *E. dissimilis* and *N. tippecanoe* should be considered for inclusion as state-endangered in Illinois. Their ranges within the state appear much smaller than that of the Illinois state-endangered *E. camurum*, which occurs in the Salt Fork, Middle Fork, lower North Fork, and Vermilion River mainstem (Tiemann 2008). A single stochastic event in the mainstem could have deleterious effects on both populations. Regardless, because the fishes occur sympatrically with *E. camurum* and the state-threatened *E. x-punctatus* (Smith 1979), the habitats of *E. dissimilis* and *N. tippecanoe* have some protection. Prior to our discovery, 192 species of fishes were reported as native to Illinois (Burr and Page 2009; Tiemann and Sabaj 2012). With the addition of *E. dissimilis* and *N. tippecanoe*, there are now at least 194 species of native fishes recognized in the state. Continued documentation of imperiled fishes being detected or expanding their ranges, especially in streams recovering from anthropogenic disturbances, provides insight to the quality of the ecosystem and aids natural resource agencies in planning and implementing restoration projects. Lastly, we support the vouchering of physical specimens when conducting field surveys. Voucher specimens are critical in verifying the authenticity of an organism, as well as being a tool for identifying localities of the taxon (Rocha et al. 2014). Without the 2014 voucher specimen, important information on the discovery of *N. tippecanoe* would have been missed.

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