

## Occurrence of *Lepomis miniatus* (Redspotted Sunfish) in the Cumberland River Basin of Tennessee

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**Abstract** - The reported, natural distribution of *Lepomis miniatus* (Redspotted Sunfish) encompasses the Mississippi Valley and Gulf Slope drainages, but not the Cumberland River basin of Tennessee. We provide an account of 3 cataloged specimens collected from Mill Creek in the Cumberland River basin at Standing Stone State Park, TN. Review of previously unpublished records around Lake Barkley and Standing Stone Lake combined with collection of multiple specimens upstream and downstream of Standing Stone Lake suggest a naturalized population now exists 421 river km outside of the previously documented range. Range expansion in the Cumberland River basin is likely related to human introduction ultimately arising from stock contamination.

*Lepomis miniatus* (Jordan) (Redspotted Sunfish) inhabits a variety of slow-moving or still waters within its reported range (Boschung and Mayden 2004, Etnier and Starnes 1993). Warren et al. (2000) described 24 basins or river units located in the Mississippi Valley and Gulf Slope drainages with records of Redspotted Sunfish, including the Cumberland and lower Tennessee rivers. In the Cumberland River basin of Kentucky, Redspotted Sunfish records are restricted to the lower basin near Lake Barkley and its tributaries. The first vouchered specimens from the Cumberland River basin were collected near Lake Barkley and deposited by Warren et al. (1991) at the Southern Illinois University at Carbondale (*Lepomis miniatus*, SIUC 17830 [2] old channel Crooked Creek [Cumberland River Drainage], 7.2 km N Golden Pond, ~1.3 km SSE Ferguson Springs, Trigg County, KY). Lee et al. (1980) reported a translocated record of a specimen from the *Lepomis punctatus* (Valenciennes) (Spotted Sunfish) complex, of which Redspotted Sunfish was a subspecies until elevation to species level by Warren (1992). The translocation reported by Lee et al. (1980) occurred in the Red River basin of Kentucky, a direct tributary to Lake Barkley, with no existing voucher nor indication of where the record originated. The Fishes of Tennessee (Etnier and Starnes 1993) lists Redspotted Sunfish as occurring in the lower Tennessee River basin and does not report occurrences in the Cumberland River basin. In addition to these disjunct distribution accounts, the Tennessee Valley Authority (TVA) found Redspotted Sunfish during recent sampling (2008–2010) of several Lake Barkley tributary embayments and in Lake Barkley (River Miles 58–102; J. Simmons, TVA, Chattanooga, TN, unpubl. data). Collectively, these reports suggest Redspotted Sunfish distribution is restricted to the lower Cumberland River basin with upstream occurrences limited to the vicinity of Lake Barkley and its tributaries.

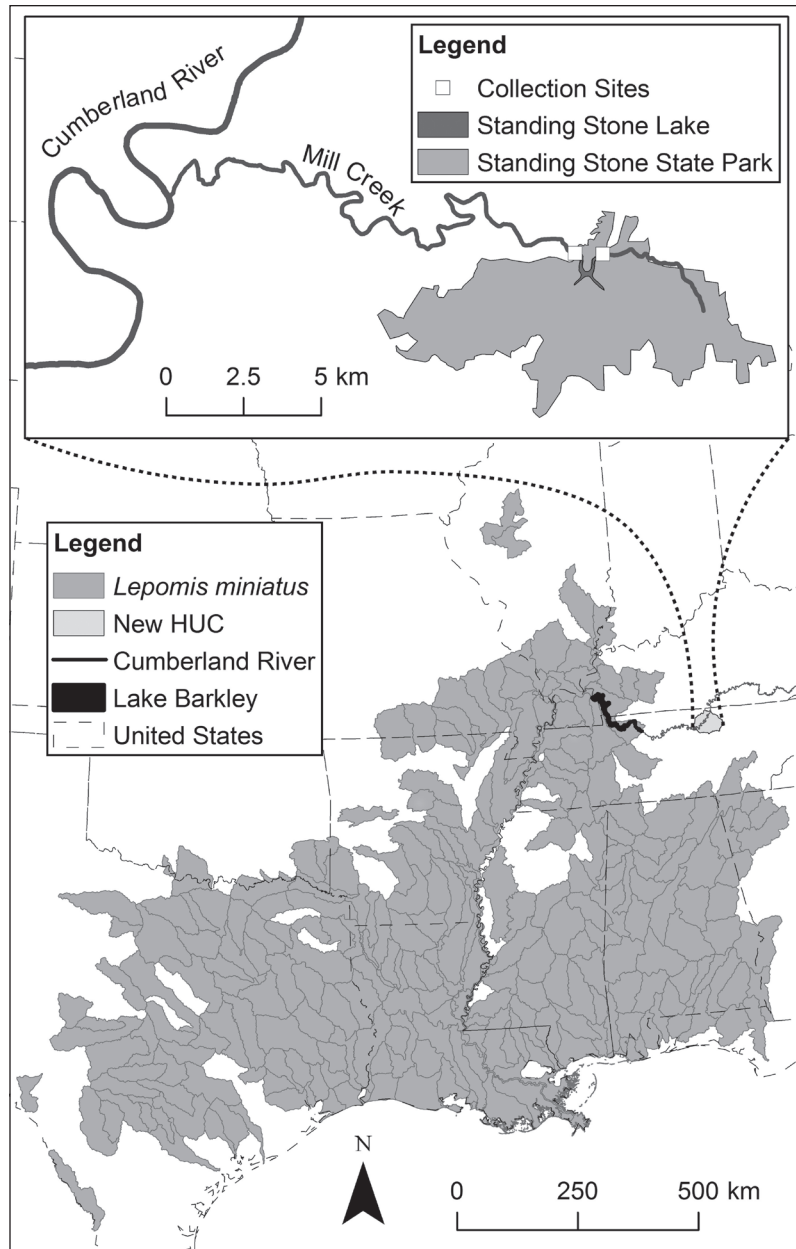
During a field survey conducted by the Tennessee Technological University Ichthyology Class on 19 September 2015, we collected Redspotted Sunfish at Standing Stone State Park in Overton County, TN (Fig. 1). Using single-pass, direct-current backpack electrofishing, we collected 3 individuals in Mill Creek upstream of Standing Stone Lake (36°28'19.1"N, 85°24'35.9"W) and 5 individuals downstream of the impoundment (36°28'21.7"N, 85°25'11.3"W). We retained 1 voucher specimen (Fish A, 98 mm in total length [TL]) from upstream of Standing Stone Lake and 2 voucher specimens (Fish

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B, 111 mm in TL; Fish C, 129 mm in TL) from downstream. Voucher specimens were positively identified, preserved in 10% formalin, and deposited in the Tennessee Technological University Ichthyology Research Collection in Cookeville, TN (Voucher ID for A: TTUIRC413; B, C: TTUIRC414). We identified Redspotted Sunfish using the presence and variation in red or orange chromatophores and published meristics, including short, rounded pectoral fins that did not reach the nostril when placed forward against the head, lateral-line scale counts within 35–39 (A–C = 38), small mouths, bony opercular lobes, and complete lateral lines (Boschung and Mayden 2004, Etnier and Starnes 1993). Specifically, specimens were characterized by pale olive sides with red spots along the sides and

Figure 1. Distribution of *Lepomis miniatus* (Redspotted Sunfish) according to NatureServe (2016; darker gray shading; hydrologic unit code [HUC] 8 polygons) illustrating the introduced population in the Cumberland River basin in northcentral Tennessee. The insert illustrates collection sites where Redspotted Sunfish were captured upstream and downstream of Standing Stone Lake at Standing Stone State Park.



vent (Boschung and Mayden 2004, Warren 1992). The similar Spotted Sunfish is reported to only occur in Tennessee in the Conasauga catchment of the Coosa River and is differentiated through meristic counts and as having black spots along its sides (Boschung and Mayden 2004, Warren 1992).

Localized occurrence of Redspotted Sunfish around Standing Stone Lake indicates human introduction likely played a role in establishment of the population. For decades, stocking of predator–prey fish (e.g., *Micropterus salmoides* (Lacepède) [Largemouth Bass] and *Lepomis macrochirus* Rafinesque [Bluegill]) into aquatic systems has been commonplace, and centrarchids are one of the most widely introduced families of fishes worldwide (Cooke and Phillip 2009). Due to the establishment of many nonnative populations of *Lepomis* spp., there exists a high probability that the Redspotted Sunfish population was an inadvertent release that occurred via stock contamination (P. Bettoli, USGS, Cookeville, TN, pers. comm.). Unpublished fishery research at Standing Stone Lake by Bettoli (1991) included a report of Spotted Sunfish ( $n = 3$ ) within one year of the reservoir being completely drained. Given that Redspotted Sunfish was still considered a subspecies at the time of Bettoli (1991), it is likely the collected specimens were indeed Redspotted Sunfish rather than Spotted Sunfish, but lack of vouchers precludes testing this hypothesis. Regardless, considering that Spotted Sunfish range does not include the Cumberland River basin in Tennessee (Fig. 1), transplant of a population likely occurred. The 25 years between collections by Bettoli (1991) and the 2015 TTU Ichthyology Class, occurrence of multiple individuals of various sizes (98–129 mm in TL), and collection of specimens upstream and downstream of Standing Stone Lake conjointly suggest a naturalized population of Redspotted Sunfish is established 421 river km (measured along the mainstem Cumberland River) outside of the formerly reported range of the species. Though Redspotted Sunfish has declined in northern portions of its current range due to habitat loss and deteriorating water quality (Nyboer et al. 2006, Smith 1979), the species is considered stable in the southeast United States (Warren et al. 2000). Future monitoring will be required to document potential range expansion within the Cumberland River basin as a result of this introduction.

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