Chucky Madtom
(*Noturus crypticus*)

5-Year Status Review:
Summary and Evaluation

Top photo by B. M. Burr, Greene County, TN - SIUC 23165
Bottom photo by J.R. Shute

U.S. Fish and Wildlife Service
Southeast Region
Tennessee Ecological Services Field Office
Cookeville, Tennessee

April 2024

STATUS REVIEW

Chucky Madtom (*Noturus crypticus*)

GENERAL INFORMATION

Current Classification: Endangered

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Date of original listing: September 8, 2011 (76 FR 48722; August 9, 2011; Service 2011).

Critical habitat final rule: November 15, 2012 (77 FR 63603; October 16, 2012; Service 2012).

Methodology used to complete the review: In accordance with section 4(c)(2) of the Endangered Species Act of 1973, as amended (Act), the purpose of a status review is to assess each threatened species or endangered species to determine whether its status has changed and if it should be classified differently or removed from the Lists of Threatened and Endangered Wildlife and Plants. The U.S. Fish and Wildlife Service (Service) evaluated the biology, habitat, and threats of the Chucky madtom to inform this status review. All recommendations resulting from this review are the result of thoroughly reviewing the best available information on the madtom. Upon query of species experts, no new information has been obtained other than dates of surveys that resulted in negative findings for the species. All comments received were evaluated and incorporated into this final document.

FR Notice citation announcing the species is under active review:
May 7, 2018 (83 FR 20092)

Species' Recovery Priority Number at start of 5-year review (48 FR 43098): 5, signifying a high degree of threat and low recovery potential. The Chucky madtom is taxonomically categorized as a species.

Review History:
The first 5-year review summary evaluation was completed on August 15, 2019, which recommended no change in status (Service 2019).

REVIEW ANALYSIS

Listed Entity

Taxonomy and nomenclature

There have been no changes to the taxonomic status of the Chucky madtom (*Noturus crypticus*) since the last 5-year review, and it is still considered valid by the Service.

Distinct Population Segment (DPS)

The Act defines species as including any subspecies of fish or wildlife or plants, and any distinct population segment of any species of vertebrate wildlife. This species was not listed as a DPS, and we have no new information that would indicate the species should be listed as a DPS under the Service's 1996 DPS Policy.

Recovery Criteria

Recovery Plan or Outline

Final Recovery Plan for the Chucky madtom (*Noturus crypticus*), May 2018 (Service 2018a).

Recovery plans are not regulatory documents and are intended to provide guidance to the Service, States, and other partners on methods of minimizing threats to listed species and on criteria that may be used to determine when recovery is achieved. If the recovery criteria defined in the plan are still valid, meeting recovery criteria can indicate that the species no longer requires protections under the Act. However, when recommending whether a listed species should be delisted, the Service must apply the factors in section 4(a) of the Act (84 FR 45020).

The Chucky madtom will be considered for removal from the Federal list of Endangered and Threatened Wildlife and Plants upon meeting the following criteria:

1. *Threats and causes of decline have been reduced or eliminated to a degree that the Chucky madtom does not need protection under the ESA (addresses Factor A and E).*
2. *Population studies show that a viable Chucky madtom population in Little Chucky Creek and at least 1 other stream (Dunn Creek, Jackson Branch; e.g., the only known stream representing the historical range of the species) are naturally recruiting and sustainable (addresses Factors A, C, and E).*

Neither criterion has been met. No individuals of the species have been encountered since 2004.

Biology and Habitat Summary

Chucky madtoms (*Noturus crypticus*) are members of the catfish family (*Ictaluridae*), genus *Noturus,* and subgenus *Rabida* (Burr and Stoeckel 1999, Page and Burr 2011). With lengths ranging up to 2.9 inches, this species has vibrant coloration and other identifiable key features: 1) relatively short and chunky body shape, 2) mottled or dark blotches on dorsal, 3) adipose fin blotch, 4) lack of a ventral caudal peduncle saddle (Burr et al. 2005). Details on the biology and life history of the species can be found in the previous 5-year review (Service 2019) and the species' biological report (Kuhajda et al. 2018).

The Chucky madtom is historically known from two stream systems in eastern Tennessee (Dunn Creek, Sevier County and Little Chucky Creek, Greene County) and 15 individuals. The Dunn Creek population is believed to be extirpated (Burr et al. 2005). At the time of the species description (2005), species experts believed the species to exist only in Little Chucky Creek at a very low density - probably fewer than 100 individuals (Burr et al. 2005). Currently, the species is thought to persist only in Little Chucky Creek, where a total of 14 individuals has been collected since 1991. None have been captured since 2004 despite considerable survey effort. An environmental DNA (eDNA) study of Little Chucky Creek is being conducted by the Tennessee Cooperative Fishery Research Unit at Tennessee Technological University in order to more thoroughly address this concern. Initial study results are expected during summer, 2024.

The range of this species has not changed in the last decade. Little Chucky Creek in Greene County, Tennessee (Figure 1), is the one stream last known to be occupied by, and the only designated critical habitat for, the Chucky madtom. From the sample size obtained during repeated monitoring efforts over two decades, there is insufficient data to develop a population estimate for this species.

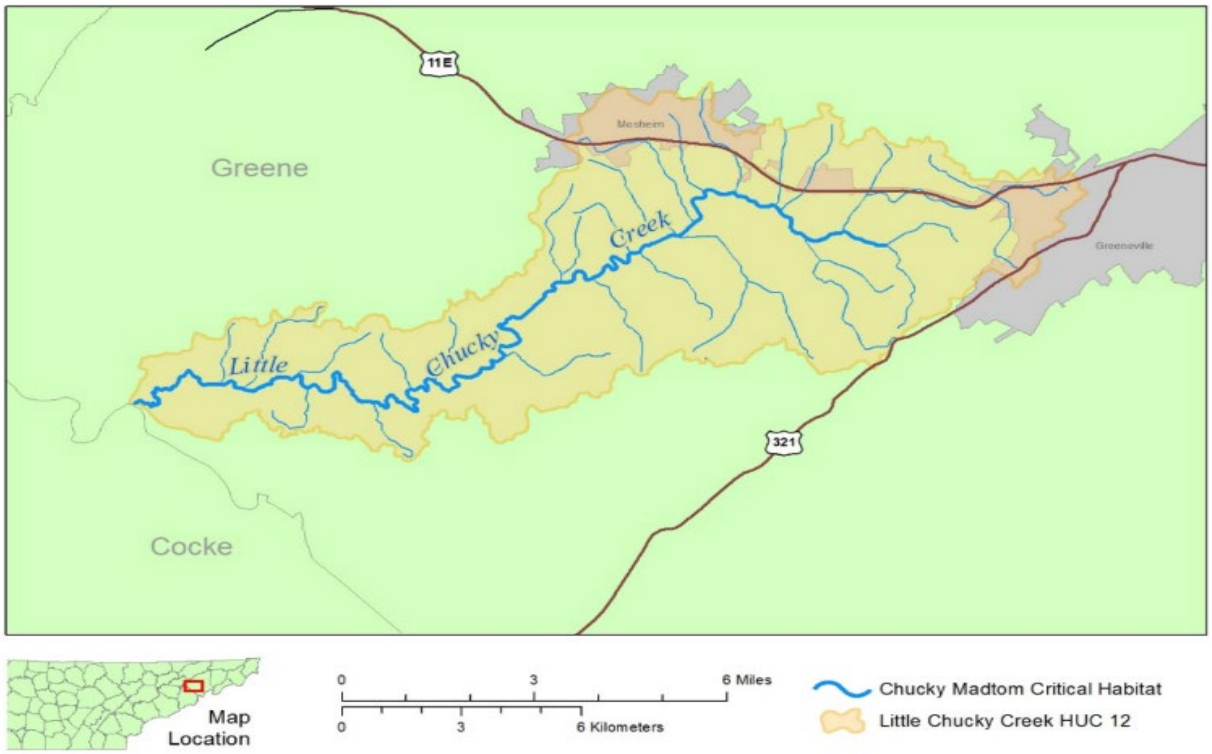

Figure 1. Chucky madtom critical habitat: Little Chucky Creek critical habitat accounts for 32 kilometers of the stream channel. Report from Kuhajda et al. (2018).

Two individuals were collected from Little Chucky Creek in 2004 and transported to a captive rearing facility of Conservation Fisheries, Inc. (CFI) for the purpose of initiating a captive propagation program (Rakes pers. comm. 2008). However, the female died before spawning could occur; therefore, captive propagation attempts were unsuccessful. No additional

individuals have been found since that time, although extensive effort has been expended in assessing the species' presence (Appendix A). This species, as in the cases of other madtoms, likely has a low detection rate because of its small size, secretive nature, and rarity on the landscape.

Threats (Five-Factor Analysis) Summary

The status of a species is determined from an assessment of factors specified in section 4 (a)(1) of the Act, including: Factor A: the present or threatened destruction, modification, or curtailment of its habitat or range; Factor B: overutilization for commercial, recreational, scientific, or educational purposes; Factor C: disease or predation; Factor D: the inadequacy of existing regulatory mechanisms; Factor E: other natural or manmade factors affecting its continued existence. A detailed summary of threats to Chucky madtom can be found in the Service's 2018 Recovery Plan, the Species Biological Report, and the 2019 5-year review (Service 2018a, Kuhajda et al. 2018, and Service 2019, respectively). A summary of the current threats to the species can be found below.

The current range of the Chucky madtom is believed to be restricted to an approximately 1.8-mi (3-km) reach of Little Chucky Creek in Greene County, Tennessee, and the species is considered extirpated from Dunn Creek in Sevier County, Tennessee. Past habitat fragmentation, habitat alteration, and degradation (e.g., increased sedimentation and impaired water quality) appear to have resulted in increased rarity and possible extirpation of the species across its historical range (Service 2011, 2019; Kuhajda et al. 2018). The primary cause of habitat loss and degradation is likely agricultural management (Factor A). The species' habitat is within an agricultural watershed, leaving aquatic systems susceptible to a variety of problems - including sedimentation, algal blooms from nutrient runoff, anoxic conditions, contamination, and other water quality impairment. Like all catfish, the Chucky madtom uses chemoreception (the ability to taste or detect chemical constituents), resulting in the species' sensitivity to chemical changes in water. Chemical change has been shown to result in behavioral changes such as reduced foraging, hiding, and movement (Etnier and Jenkins 1980).

The Chucky madtom is not overutilized commercially or recreationally (Factor B). Overutilization for scientific and academic purposes could have been problematic before listing for what is apparently a very rare species on the landscape, as 8 of the 15 specimens collected were vouchered in museums for research and other purposes. Since listing, however, take for scientific purposes has been regulated by both Tennessee Wildlife Resources Agency and the Service; therefore, it is no longer considered a threat.

Disease is not a known factor in the decline of Chucky madtoms (Factor C). Competition for habitat space and predation on Chucky madtom eggs from invasive crayfish have been found to be problematic. Crayfish and catfish are both benthic organisms that prefer rocky riparian areas, but research has shown that crayfish are capable of outcompeting similar madtom species for that space (Harris et al. 2020). Two introduced species, the virile crayfish (*Orconectes virilis*) and Kentucky River crayfish (*Orconectes juvenilis*), are abundant in Little Chucky Creek and may be cause for decline by outcompeting Chucky madtoms for habitat and younger life stages (i.e., eggs and larvae) serving as prey for the crayfish (Kuhajda et al. 2018).

The Chucky madtom and its habitats are afforded limited protection from water quality degradation under the Clean Water Act of 1977 (33 U.S.C. 1251 et seq.) and the Tennessee Water Quality Control Act of 1977. Little Chucky Creek is considered a "non-impaired stream" by the state of Tennessee, and there are no known efforts to monitor or improve water quality (Factor D). In addition, the Chucky madtom is listed as Endangered by the State of Tennessee. The Tennessee Nongame and Endangered or Threatened Wildlife Species Conservation Act of 1974 (Tennessee Code Annotated §§ 70-8-101-112) and Tennessee Wildlife Resources Commission's "Proclamation 00-15 Endangered or Threatened Species" provide some protection to individual fish and preclude the known destruction of habitat without consideration of alternatives for the species' welfare. Although these protections are in place, they have thus far been insufficient to protect the species from all threats.

Climate change is expected to result in increased temperatures, increase in droughts, and increases in extreme weather events (Factor E; Runkle et al. 2022), thereby contributing to potential species impacts. Reduced water availability may be a significant threat to the Chucky madtom in the long term because an increase in the frequency and duration of dewatering events of suitable habitat could lead to reduced reproduction, lower nest success rates, and/or increased mortality. Climate change has the potential to negatively affect the species by increasing the frequency and severity of drought, which in turn can lead to elevated water temperature, low dissolved oxygen levels, and other sources of stress. Increased frequency of storms could cause increases in runoff from the surrounding agricultural landscape.

Currently, the population is sparse enough that Chucky madtom density could not be estimated (Factor E). Efforts at captive propagation have been unsuccessful. The Chucky madtom's limited geographic range and apparent small population size leave the species extremely vulnerable to decreased fitness due to reduced genetic diversity. Localized extinctions could also result from accidental toxic chemical spills or other stochastic disturbances.

Synthesis

The Chucky madtom is a small catfish species that is endemic to Little Chucky Creek in Greene County, Tennessee, and it appears not to be extant within a former part of its range (i.e., Dunn Creek, Little Pigeon River watershed, Sevier County, Tennessee). No individuals have been observed in any location since 2004, but an eDNA study is expected to provide updated information about the species' possible presence in 2024. The species appears to have been rare on the landscape since its first discovery in the 1990s; and, like other madtom species, its cryptic nature makes it difficult to detect. Its habitat lies within an agricultural area, where it is potentially threatened by runoff with significant sediment, nutrient, and chemical loads. Invasive crayfish species also are considered a threat, primarily due to competition and potential as a predator on eggs and larval individuals. Because of the ongoing threats and the current low number of individuals, we believe the Chucky madtom continues to meet the definition of an endangered species.

RECOMMENDED FUTURE ACTIVITIES

A detailed recovery plan and criteria are presented in the Recovery Plan and Recovery Implementation (Service 2018b). Recovery activities include: creation of an ark (captive) population with broodstock, restoration and protection of existing riparian habitat in Little Chucky Creek, promotion of voluntary stewardship on private lands to reduce nonpoint source discharges, and implementing programs to raise public awareness about the species.

Monitoring and research activities include: conducting life history studies on the Chucky madtom or its close relatives, expansion of monitoring beyond the known range of the species, developing models to identify other potential Chucky madtom habitat, and expanding monitoring to include night sampling and eDNA analysis. The eDNA study currently being conducted by the Tennessee Cooperative Fishery Research Unit is expected to provide initial information in addressing the need for evidence of the species' presence or likely absence in 2024, and subsequent research will be conducted as determined necessary.

REFERENCES

Burr, B.M., and D.J. Eisenhour. 1994. Final Report, Status Survey of Chucky Madtom (Ictaluridae: *Noturus* sp.) in East Tennessee. Department of Zoology, Southern Illinois University at Carbondale, Carbondale, Illinois.

Burr B.M., J.D. Eisenhour, and M.J. Grady. 2005. Two new species of *Noturus* (Siluriformes: Ictaluridae) from the Tennessee River Drainage: Description, distribution, and conservation status. The American Society of Ichthyologists and Herpetologists 783-802.

Burr, B. M., and J.N. Stoekel. 1999. The natural history of madtoms (genus *Noturus*), North America's diminutive catfishes. American Fisheries Society 51-101.

Etnier, D.A., and R.E. Jenkins. 1980. *Noturus stanauli*: a new madtom catfish (Ictaluridae) from the Clinch and Duck Rivers, Tennessee. Bulletin of the Alabama Museum of Natural History 5.

Harris, M.H., K.I. Womble, and B.J. Alford. 2020. Size-Specific Advantage in Shelter Competition Between the Mountain Madtom and Crayfishes. Journal of Fish and Wildlife Management 11(2):401-409.

Lang N.J., S.L. Powers, and R.L. Mayden. 2001. Final Report, Status survey of the chucky madtom. *Norturus sp. Cf. elegans*, in northern Alabama and eastern Tennessee, Contract #1448-40181-00-G-198. Department of Biological Sciences, Saint Louis University, St. Louis, MI; Department of Biological Sciences, University of Alabama, Tuscaloosa, Alabama.

Kuhajda, B.R., A.L. George, and S. Chance. 2018. Species Biological Report for Chucky Madtom (*Noturus crypticus*). U.S. Fish and Wildlife Service, Cookeville, Tennessee. 21 pp.

Matthews, D.C. 2024. Personal Communication. Tennessee Valley Authority. Email to David Pelren on January 10, 2024, transmitting fish sampling data.

Page, L.M, and B.M. Burr. 2011. Peterson Field Guide to Freshwater Fishes of North America North of Mexico. Houghton Mifflin Harcourt Publishing Company, New York, New York.

Rakes, P.L. 2008. Personal communication from Conservation Fisheries, Inc. to the Service. 2008.

Rakes, P.L., and J.R. Shute. 2004. Surveys for the Chucky Madtom *(Noturus* sp. cf. *elegans*) in Little Chucky Creek, Greene County, Tennessee. Conservation Fisheries, Knoxville, Tennessee.

Runkle, J., K.E. Kunkel, D.R. Easterlng, L.E. Stevens, B.C. Stewart, R. Frankson, L. Romolo, J. Neilsen-Gammon, T.A. Joyner, and W. Tollefson. 2022. Tennessee State Climate Summary 2022. NOAA Technical Report NESDIS 150-TN. NOAA/NESDIS, Silver Spring, MD, 5 pp.

Shute, P.W., P.L. Rakes, and J.R. Shute. 1997. Status Survey of the Chucky Madtom (*Noturus* sp. *cf. elegans*), Final Report, TWRA Contract No. GR-5-106052-6-01. Conservation Fisheries, Knoxville, Tennessee.

U.S. Fish and Wildlife Service (Service). 2011. Endangered Status for the Cumberland Darter, Rush Darter, Yellowcheek Darter, Chucky Madtom, and Laurel Dace. Federal Register 76: 48722-48741.

U.S. Fish and Wildlife Service (Service). 2012. Designation of Critical Habitat for the Cumberland Darter, Rush Darter, Yellowcheek Darter, Chucky Madtom, and Laurel Dace. Federal Register 77: 63604-63668.

U.S. Fish and Wildlife Service (Service). 2018a. Final Recovery Plan for the Chucky Madtom (*Noturus crypticus*). Cookeville, Tennessee. 4pp.

U.S. Fish and Wildlife Service (Service). 2018b. Recovery Implementation Strategy Chucky Madtom (*Noturus crypticus*). Cookeville, Tennessee. 15 pp.

U.S. Fish and Wildlife Service (Service). 2019. Chucky Madtom (*Noturus crypticus*) 5-Year Review Summary Evaluations. Cookeville, Tennessee.

Weber, A.S., and J.B. Layzer. 2007. Habitat Characterization and Surveys for the Chucky Madtom (*Noturus crypticus*) in the Little Chucky Creek Drainage. U.S. Geological Survey: Tennessee Cooperative Fishery Research Unit, Tennessee Technological University, Cookeville, Tennessee.

RESULTS / SIGNATURES

U.S. FISH AND WILDLIFE SERVICE

Status Review of the Chucky Madtom

Status Recommendation:

On the basis of this review, we recommend the following status for this species. A 5-year review presents a recommendation of the species status. Any change to the status requires a separate rulemaking process that includes public review and comment, as defined in the ESA.

____ Downlist to Threatened
____ Uplist to Endangered
____ Delist (Indicate reasons for delisting per 50 CFR 424.11):
____ *The species is extinct.*
____ *The species does not meet the definition of an endangered or threatened species.*
____ *The listed entity does not meet the statutory definition of a species.*
_X_ No change needed

FIELD OFFICE APPROVAL:

Field Supervisor, Tennessee Ecological Services Field Office, U.S. Fish and Wildlife Service

Approve DANIEL ELBERT Digitally signed by DANIEL ELBERT Date: 2024.04.10 08:54:50 -05'00'

APPENDIX A.

Catalog of surveys that specifically targeted Chucky madtom or were within the streams with past known occurrences.

The table is grouped by counties/locations and sorted chronologically. All counties are in Tennessee, except those otherwise denoted. Locations where Chucky madtoms were located are denoted with bold. Locations now considered outside of the range of Chucky madtom are denoted with an asterisk.

Year	Number Observed	Number of Survey Sites	Survey Location (River System)	County	Citation
1940	**1**	**N/A**	**Dunn Creek - Jones Cove at mouth of Yellow Breeches Creek; (French Broad)**	**Sevier**	**Burr et al. 2005 (UMMZ 131386)**
1991	**2**	**N/A**	**Little Chucky Creek (Nolichucky)**	**Greene**	**TVA collection (Burr et al. 2005)**
1993-1994	**9**	**5 (2 sites observed)**	**Little Chucky Creek (Nolichucky)**	**Greene**	**Burr and Eisenhour 1994**
1993	0	3	Nolichucky River	Greene, Cock/Hamblen	Burr and Eisenhour 1994
1993	0	1	Meadow Creek (Nolichucky)	Greene	Burr and Eisenhour 1994
1993	0	1	Sinking Creek (Nolichucky)	Greene	Burr and Eisenhour 1994
1993	0	1	Horse Creek (Nolichucky)	Greene	Burr and Eisenhour 1994
1993	0	1	Big Limestone Creek (Nolichucky)	Washington	Burr and Eisenhour 1994
1993	0	3	Lick Creek (Nolichucky)	Greene	Burr and Eisenhour 1994
1993	0	1	Roaring Fork (Nolichucky)	Greene	Burr and Eisenhour 1994
1993	0	1	Spivey Creek (Nolichucky)	Unicoi	Burr and Eisenhour 1994
1993	0	1	Clear Creek (French Broad)	Cocke	Burr and Eisenhour 1994
1994	0	1	Bent Creek (Nolichucky)	Hamblen	Burr and Eisenhour 1994
1995-1996	0	5	Little Chucky Creek (Nolichucky)	Greene	Shute et al. 1997
1995	0	1	Oven Creek (Nolichucky)	Cocke	Shute et al. 1997
1996	0	1	Cove Creek (Nolichucky)	Greene	Shute et al. 1997
1995	0	3	Lick Creek (Nolichucky)	Greene	Shute et al. 1997
1995	0	2	Meadow Creek (Nolichucky)	Greene	Shute et al. 1997
1995-1996	0	2	Bent Creek (Nolichucky)	Hamblen	Shute et al. 1997

Year	Number Observed	Number of Survey Sites	Survey Location (River System)	County	Citation
1995	0	4	Little Pigeon River (French Broad)	Sevier	Shute et al. 1997
1995	0	1	East Fork Little Pigeon River (French Broad)	Sevier	Shute et al. 1997
1995	0	1	Bird Creek (French Broad)	Sevier	Shute et al. 1997
1995-1996	0	2	Dunn Creek (French Broad)	Sevier	Shute et al. 1997
1995	0	1	Chucky Creek (French Broad)	Sevier	Shute et al. 1997
1996	0	3	Mink Creek (Nolichucky)	Greene	Shute et al. 1997
1996	0	1	Unnamed tributary to Bent Creek (Nolichucky)	Hamblen	Shute et al. 1997
1996	0	1	Mud Creek (Nolichucky)	Hamblen	Shute et al. 1997
1996	0	1	Lyons Creek (Nolichucky)	Hamblen	Shute et al. 1997
1996	0	1	Paint Creek (French Broad)	Cocke	Shute et al. 1997
1996	0	1	Paint Creek (French Broad)	Greene	Shute et al. 1997
1996	0	3	Walker Fork and tributary (Holston River)	Sullivan	Shute et al. 1997
1996	0	1	Big Creek (Holston River)	Hawkins	Shute et al. 1997
1996	0	1	Upper Beech Creek (Holston River)	Hawkins	Shute et al. 1997
1996	0	1	Fisher Creek (Holston River)	Hawkins	Shute et al. 1997
1997	0	1	Little Chucky Creek (Nolichucky)	Greene	D.Matthews pers.comm. 2024
2000	**1**	**?**	**Little Chucky Creek (Nolichucky)**	**Greene**	**Lang et al. 2001**
2001	0	3	Little Chucky Creek (Nolichucky)	Greene	Lang et al. 2001
2001	0	1	Dunn Creek (French Broad)	Sevier	Lang et al. 2001
2001	0	5	Tributaries to the Flint River (AL)	multiple*	Lang et al. 2001
2001	0	3	Tributaries to the Elk River (AL/TN)	multiple*	Lang et al. 2001
2001	0	18	Tributaries to the Paint Rock River (AL/TN)	multiple*	Lang et al. 2001
2001	0	6	Tributaries to the Tennessee River (AL)	multiple*	Lang et al. 2001
2001	0	1	Tributary to Hickory Creek (Cumberland River)	Warren*	Lang et al. 2001
2002-2003	0	9-10	Little Chucky Creek (Nolichucky) (15 surveys with 134 person-hours of instream effort)	Greene	Rakes and Shute 2004

Year	Number Observed	Number of Survey Sites	Survey Location (River System)	County	Citation
2003	0	1	Little Chucky Creek (Nolichucky)	Greene	D.Matthews pers.comm. 2024
2004	**2**	**?**	**Little Chucky Creek (Nolichucky)**	**Greene**	**Rakes pers. comm. 2008**
2005	0	12	Little Chucky Creek (Nolichucky)	Greene	Weber and Layzer 2007
2005	0	22	Tributaries to the Little Chucky Creek (Nolichucky)	Greene	Weber and Layzer 2007
2005	0	1	Little Chucky Creek (Nolichucky)	Greene	D.Matthews pers.comm. 2024
2006	0	1	Little Chucky Creek (Nolichucky) – 3 person-hours	Greene	Rakes 2006 (CFI 2006 Permit Report TE011542)
2008	0	1	Little Chucky Creek (Nolichucky)	Greene	D.Matthews pers.comm. 2024
2014	0	1	Little Chucky Creek (Nolichucky)	Greene	D.Matthews pers.comm. 2024
2022	0	1	Little Chucky Creek (Nolichucky)	Greene	D.Matthews pers.comm. 2024