

**U.S. FISH AND WILDLIFE SERVICE
SPECIES ASSESSMENT
AND LISTING PRIORITY ASSIGNMENT FORM
March 14, 2023**

SCIENTIFIC NAME: *Nothonotus microlepidus*

COMMON NAME: Smallscale Darter

LEAD REGION: Region 4

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DATE INFORMATION CURRENT AS OF: September 2023

STATUS/ACTION

Species petitioned for listing which we have determined does not warrant listing (does not meet the definition of a threatened or endangered species)

Petition Information:

Non-petitioned

Petitioned; Date petition received: 20 April 2010

90-day “substantial” finding 27 September 2011; 76 FR 59836

PREVIOUS FEDERAL ACTIONS:

On April 20, 2010, we received a petition from the Center for Biological Diversity, Alabama Rivers Alliance, Clinch Coalition, Dogwood Alliance, Gulf Restoration Network, Tennessee Forests Council, and West Virginia Highlands to list 404 aquatic, riparian, and wetland species, including smallscale darter (*Nothonotus microlepidus*), as endangered or threatened species under the Act. On September 27, 2011, we published a 90-day finding (76 FR 59836) that the petition contained substantial information indicating listing may be warranted for the species. This document constitutes our 12-month finding on the April 20, 2010, petition to list smallscale darter under the Act.

Fish, Family Percidae (perches), subfamily Etheostomatinae (darters):

ANALYTICAL FRAMEWORK

To assess smallscale darter viability, we conducted a species status assessment (SSA) using the three conservation biology principles of resiliency, redundancy, and representation (Shaffer and Stein 2000, pp. 306–311). Briefly, resiliency supports the ability of the species to withstand

environmental and demographic stochasticity (for example, wet or dry, warm or cold years, variation in demographic rates), redundancy supports the ability of the species to withstand catastrophic events (for example, droughts, large pollution events), and representation supports the ability of the species to adapt to both near-term and long-term changes in its physical and biological environment (for example, climate change, disease). A species with a high degree of resiliency, representation, and redundancy is better able to adapt to novel changes and to tolerate environmental stochasticity and catastrophes. In general, species viability will increase with increases in resiliency, redundancy, and representation (Smith *et al.* 2018, p. 306). Using these principles, we identified the species' ecological requirements for survival and reproduction at the individual, population, and species levels, and described the beneficial and risk factors influencing the species' viability.

We use the SSA framework to assemble the best scientific and commercial data available for this species. The SSA framework consists of three sequential stages. During the first stage, we evaluate the species' needs. The next stage involves an assessment of the historical and current condition of the species' demographics and habitat characteristics, including an explanation of how the species arrived at its current condition (i.e., how threats and conservation actions have influenced the species). The final stage of the SSA framework involves assessing the species' plausible range of future responses to positive and negative environmental and anthropogenic influences. The SSA framework uses the best available information to characterize viability as the ability of a species to sustain populations in the wild over time and is used to inform our regulatory decision.

The SSA report does not represent a decision by the Service on whether smallscale darter should be listed as an endangered or threatened species under the Act. However, it does provide the scientific basis that informs our regulatory decisions, which involve the further application of standards within the Act and its implementing regulations and policies. The Smallscale Darter (*Nothonotus microlepidus*) Species Status Assessment – September 2022, Version 1.0] (SSA Report) is a summary of the information we have assembled and reviewed and incorporates the best scientific and commercial data available for this species. Excerpts of the SSA Report are provided in the sections below. For more detailed information, please refer to the SSA Report (Service 2022, entire).

BIOLOGICAL INFORMATION

The smallscale darter is a mid-sized (up to 93 millimeters) small, freshwater fish native to the Stones River, Harpeth River, Red River, and Little River tributaries of the Cumberland River System in Kentucky and Tennessee (Figure 1). The species is extant throughout its historical range.

The smallscale darter has only been known historically from four watersheds, and while the watersheds are no longer connected because of the construction of large dams on the Cumberland and Stones rivers, the species occupies all four historical watersheds. Mitochondrial

DNA data indicates that there was likely gene flow among the four populations historically, but microsatellite genetic data provide evidence that the four populations are currently isolated from one another (Johansen et al. 2022, entire). The genetic data indicates that the species has maintained moderate levels of genetic diversity.

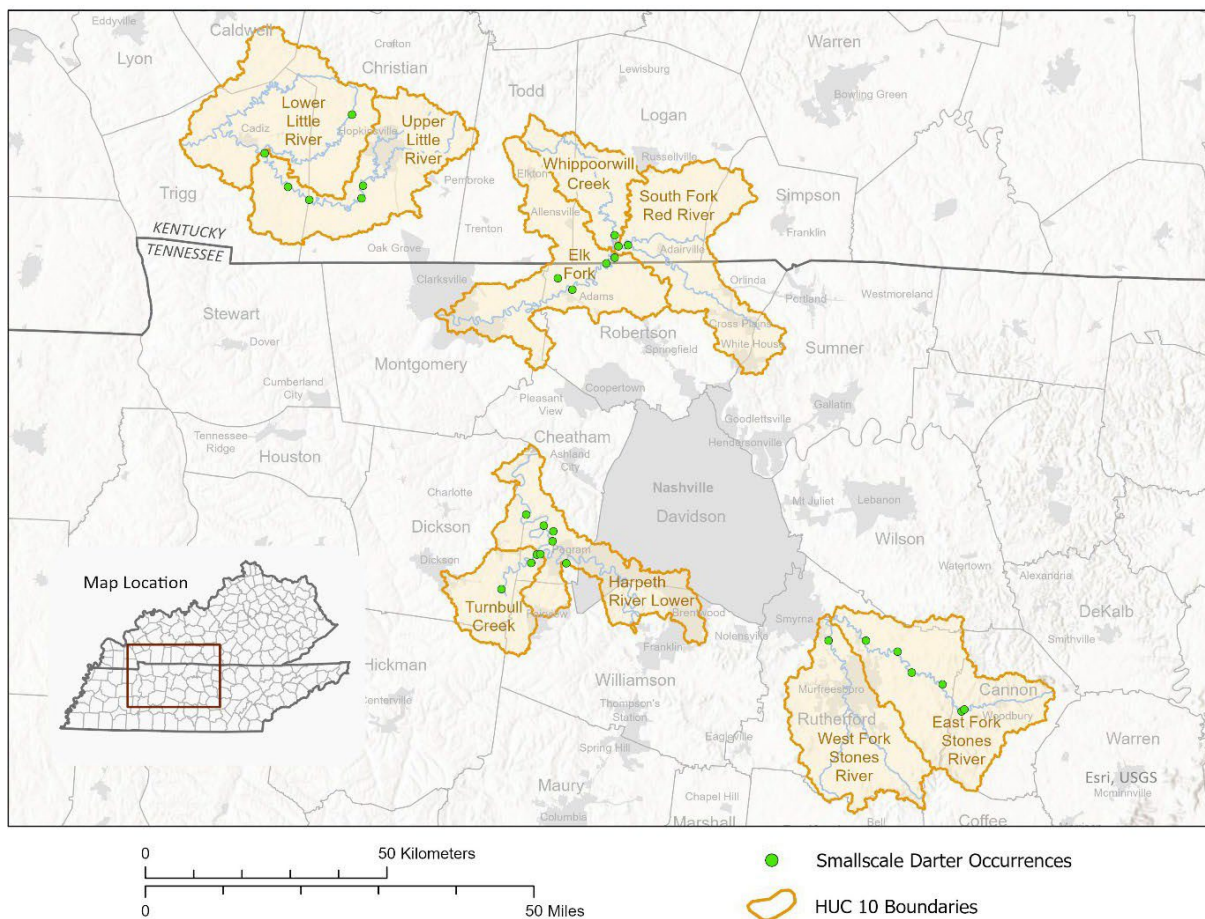


Figure 1. Map of the smallscale darter’s range, showing the four extant populations in the Stones, Harpeth, Red, and Little River systems.

Stream reaches occupied by smallscale darters tend to have stable banks, intact riparian areas, and clean cobble and boulder substrate (Etnier and Starnes 1993, pp. 503-504; Johansen *et al.* 2017, pp. 53-54). These stream characteristics support the reproductive strategy of smallscale darters, in which females attach eggs under a rock, and the males protect them until they hatch (Page *et al.* 1982, p.142). Juveniles may inhabit areas making them more vulnerable to impacts from siltation; such areas include slower and shallower streams with finer substrate than the adults (Etnier and Starnes 1993, pp. 503-504).

For additional information on the species biology, life history, and range, please refer to Chapter

2 of the SSA Report (Service 2022, pp. 5-11).

FACTORS INFLUENCING THE STATUS

The Act directs us to determine whether any species is an endangered species or a threatened species because of any factors (or threats) affecting its continued existence (i.e., whether it meets the definition of a threatened species or an endangered species). We use the term “threat” to refer in general to actions or conditions that are known to or are reasonably likely to negatively affect individuals of a species. The term “threat” includes actions or conditions that have a direct impact on individuals, as well as those that affect individuals through alteration of their habitat or required resources. The term “threat” may encompass—either together or separately—the source of the action or condition, or the action or condition itself.

However, the mere identification of any threat(s) does not necessarily mean that the species meets the statutory definition of an “endangered species” or a “threatened species.” In determining whether a species meets either definition, we must evaluate all identified threats by considering the expected response by the species, and the effects of the threats—in light of those actions and conditions that will ameliorate the threats—on an individual, population, and species level. We evaluate each threat and its expected effects on the species, then analyze the cumulative effect of all of the threats on the species as a whole. We also consider the cumulative effect of the threats in light of those actions and conditions that will have positive effects on the species—such as any existing regulatory mechanisms or conservation efforts. The Secretary determines whether the species meets the definition of an “endangered species” or a “threatened species” only after conducting this cumulative analysis and describing the expected effect on the species now and (if evaluating whether a species is a threatened species) in the foreseeable future.

Threats

Limited information is available on specific threats to the smallscale darter, but based on available information on other darters, we identified habitat destruction and degradation resulting from urbanization, agricultural land use, impoundments, and sedimentation as the primary influence on smallscale darter viability. We concluded in our analyses that impacts of isolated populations and climate change are not likely to negatively influence the species’ viability. Historically, impoundments, sedimentation, and water quality impairment have likely degraded this species’ habitat, and risk factors remain from continued development and agriculture, in addition to small population sizes and a lack of connectivity between populations. However, these factors are not significantly impacting the species’ current viability (Blanton Johansen et al. 2022; Blanton Johansen et al. 2017; Etnier and Starnes 1993), as discussed further under Current Condition. For additional information on the threats and influences on viability, please refer to Chapter 3 of the SSA Report (Service 2023, pp. 11-17).

The primary factor affecting smallscale darter viability involves negative impacts to its habitat, either through loss of suitable habitat or degradation. As noted above, the smallscale darter’s life

history requirements include river riffles with clear, high velocity water flows and suitable substrate (clean cobble and boulder) for survival and reproduction of adults, and marginal habitats with slower velocities for juveniles. Threats that may negatively affect these necessary conditions include urbanization, impoundments, and sedimentation (i.e., excess sediments suspended or deposited in a stream; water quality impairment).

Urbanization has a direct impact on flow regimes, though through different mechanisms. Increased urbanization results in increased amounts of impervious surfaces from development. Because less of the precipitation is percolating into the groundwater as a result of areas covered in impervious surface, instead running off immediately after falling, base flow can be reduced during dry periods (Walsh et al. 2005, p. 207). This increased amount of impervious surface also results in an increase of flashy flows (i.e., how fast flows increase and decrease), which can decrease water quality by destabilizing stream channels and increasing erosion (Matthaei and Lang 2016, p. 180). The Stones and Harpeth watersheds overlap with the greater Nashville, Tennessee Metropolitan Area, and the Little River population is in the urbanized Hopkinsville, Kentucky area. Despite existing overlap of populations with urban areas, all four populations exhibit a moderate combined land cover score (combined percent urban and percent agricultural land covers), and three out of four populations possess moderate-high resiliency. Therefore, the best available information indicates that populations of smallscale darter has not been impacted by these developed land types such that they are not able to withstand environmental stochasticity.

Agriculture has long been a factor in the range of the smallscale darter and continues to be a factor in all the occupied watersheds, contributing to a legacy of sediment inputs. Agriculture can impact streams by increasing runoff, sedimentation, and nutrients resulting in lower quality habitat for riffle-dwelling fish species. Watersheds with less than 50% agricultural land cover show very little changes to fish assemblages, but impacts to the fish community become more evident in watersheds with over 80% agricultural land use (Wang et al. 1997, p. 9; Roth et al. 1996, pp. 148-150; Meador and Goldstein 2003, p. 512). However, agricultural land use does have a lower overall impact on streams than urbanization does. Over time, with the expansion of Nashville, Tennessee and Hopkinsville, Kentucky, much of the agricultural land has been converted into residential and commercial development, resulting in sedimentation events associated with land disturbance from construction activities.

There are 12 impoundments within the potentially occupied reach of the Stones River watershed including J. Percy Priest Dam, and one in the occupied reach of the Red River watershed (Southeast Aquatic Resources Partnership (SARP) Aquatic Barrier Prioritization Tool, accessed June 22, 2022). Impoundments directly alter streams' flow regimes, and may cause increased siltation. Flow regimes are altered by creating pools behind the dam and scour areas downstream, potentially resulting in a lower abundance of smallscale darter in impacted areas. However, the Stones River has a higher average predicted abundance than Red River, despite having multiple impoundments.

Stream siltation (or sedimentation) is typically caused by soil erosion and stormwater runoff associated with upland land use activities. Though increased siltation (i.e., sedimentation) may also result from these dams as well as other land uses (i.e., urbanization and agriculture), the habitat used by adult smallscale darters is more resilient to sedimentation because of large substrates and high water velocity. Conversely, juvenile smallscale darters use more marginal habitats that are typically shallower, exhibit slower water velocity, and have finer substrates. The higher average predicted abundance (per 75m) in the Stones River suggests evidence of recruitment to adult life stages, and therefore, individuals in portions of marginal habitat in the watershed may be less impacted by sedimentation. In addition, because this increased abundance occurs in an area more impacted by impoundments and urbanization, we conclude that altered flow regimes and sedimentation resulting from impoundments are not negatively impacting species' viability.

As previously stated, we concluded in our analyses that isolated populations and climate change are not likely to negatively influence the species' viability. Evaluated effects of isolated populations include loss of redundancy and genetic representation, while evaluated climate change effects include drought, increased temperatures, and flooding. While the smallscale darter has a small range scattered across four isolated watersheds, the current resiliency of moderate to moderate-high for all populations, as further discussed below under Current Condition, increases the likelihood that the species could withstand a catastrophic event with a moderate current redundancy. Further, the smallscale darter currently maintains relatively high genetic diversity for a species exhibiting isolated populations, as evidenced by higher than expected heterozygosity in samples from each of the populations and low inbreeding coefficients.

Evaluated impacts of climate change include drought, temperature increases, and flooding. While climate change has the potential to increase exposure of smallscale darter to random climatic events (McLaughlin *et al.* 2002, pp. 6070–6074; Thomas *et al.* 2004, pp. 145–148), precipitation models predict the Cumberland River basin will experience little change in annual mean precipitation through 2074. Despite the presence of these threats within the range of smallscale darter, they do not appear to negatively impact the smallscale darter at the species' level.

Conservation Measures and Existing Regulatory Mechanisms

Most of the land in watersheds occupied by smallscale darter is privately owned, though publicly owned parcels do limit development and agriculture within some of these watersheds. Where conserved lands occur in the species' range, which spans approximately 1,930 square mi, they help reduce the watershed-level threats from habitat loss and degradation (Johansen *et al.* 2017, p. 49). The largest publicly owned parcel in the species' range is Cheatham Wildlife Management Area (20,810 acres) within the Harpeth watershed, and additional state conservation lands within this watershed include Montgomery Bell (3,850 acres) and Harpeth River (40 river miles) State Parks.

In addition to the benefits that state conservation lands provide, the smallscale darter receives state-level protections throughout its range. In Tennessee, the smallscale darter is considered a Species in Need of Management (TWRA 2018). Under the Tennessee Nongame and Endangered or Threatened Wildlife Species Conservation Act of 1974 (Tennessee Code Annotated §§ 70-8-101-112), "...it is unlawful for any person in Tennessee to take, attempt to take, possess, transport, export, process, sell or offer for sale or ship nongame wildlife, or for any common or contract carrier knowingly to transport or receive for shipment nongame wildlife." In Kentucky, the smallscale darter is a Species of Greatest Conservation Need (KDFWR 2013, entire). Kentucky law prohibits the collection of the smallscale darter (or other fishes) for scientific purposes without a valid state-issued collecting permit (KRS § 150.183). Enforcement of this permit requirement is difficult, but the best available information does not indicate that these activities represent a threat to the species.

The smallscale darter and its habitats are afforded some protection from water quality and habitat degradation under the Clean Water Act, SMCRA, Tennessee's Nongame and Endangered or Threatened Wildlife Species Conservation Act of 1974, Tennessee's Water Quality Control Act of 1977 (T.C.A. 69-3-101), Kentucky's Forest Conservation Act of 1998 (KRS §§149.330-355), Kentucky's Agriculture Water Quality Act of 1994 (KRS §§ 224.71-140), and additional Tennessee and Kentucky statutes and regulations regarding natural resources and environmental protection. While the protections afforded by these statutes and regulations have not prevented the degradation of some habitats used by the smallscale darter, the species has undoubtedly benefited from improvements in water quality and habitat conditions stemming from these regulatory mechanisms.

Cumulative Effects

We note that, by using the SSA framework to guide our analysis of the scientific information documented in the SSA report, we have analyzed the cumulative effects of identified threats and conservation actions on the species. To assess the current and future condition of the species, we evaluate the effects of all the relevant factors that may be influencing the species, including threats and conservation efforts. Because the SSA framework considers not just the presence of the factors, but to what degree they collectively influence risk to the entire species, our assessment integrates the cumulative effects of the factors and replaces a standalone cumulative-effects analysis.

ANALYSIS

We divided the smallscale darter's range into four analytical units (populations): Stones River, Harpeth River, Red River, and Little River. We made these divisions based on current isolation of the four watersheds by impoundments on the Cumberland and Stones rivers and further validated these divisions with population genetic data. While mitochondrial DNA data suggests that there was past connectivity among the four populations, microsatellite data provides good evidence that these populations are currently functionally isolated.

To qualitatively assess current viability, we considered four components that broadly relate to the species' physical habitat and demography. Each population's physical environment was assessed using three factors: visual habitat scores, watershed land cover (a combination of the proportion of agricultural and urban land cover) and watershed complexity. We used average predicted abundance as a fourth factor to describe population size. Visual habitat scores, land cover types, watershed complexity, and predicted abundance were used to represent the degree to which the cumulative effects of the identified threats were negatively impacting the resiliency of each population.

The impact of beneficial influences (e.g., conservation measures or existing regulatory mechanisms) is reflected in the average predicted abundance, stream system complexity, and visual habitat score; these beneficial influences are assumed to contribute positively to these habitat and demography components. Negative influences on the species' viability, including threats of habitat destruction and degradation, stem from sources such as agriculture and urbanization. To incorporate the effects of these influences on smallscale darter viability in the condition analysis, we included the metrics of percent urban and agricultural land cover as a way of identifying the relative impact of these influences on resiliency of each population. To aid in the comparison of populations and the assessment of the species' current viability using the 3Rs, we weighted the viability components equally and used the average score to describe each population's current condition.

For this assessment, the parameters for each component's condition were established by evaluating the range of existing data and separating those data into High (3), Moderate (2), and Low (1) conditions based on our understanding of the species' demographic and habitat needs (Table 1). Using these parameters, we categorized each population as being in High, Moderate, or Low condition. For further details on calculation of the average predicted abundance, visual habitat scores, urban land cover, and agricultural land cover, please refer to the methodology section in Chapter 4 of the SSA report (Service 2022, pp. 17–20).

Table 1. Current resiliency analysis metrics and category definitions.

Metric	High	Medium	Low
Average Predicted Abundance per 75m	Mean of watershed predicted abundances greater than 400 individuals	Mean of watershed predicted abundances 75–400 individuals	Mean of watershed predicted abundances less than 75 individuals
Stream System Complexity	greater than 3 occupied streams in the watershed	2 occupied streams in the watershed	1 occupied stream in the watershed
Visual Habitat Score	136–200	72–135	less than 72
Urban Land Cover	less than 10 percent	10–25 percent	greater than 25 percent

Agricultural Land Cover	less than 50 percent	50–80 percent	greater than 80 percent
Combined Land Cover Score	Both Land Cover metrics score High	Both Land Cover metrics with Moderate scores or a High and a Moderate	Either of the Land Cover metrics score Low

To assess the condition of the smallscale darter, we considered the degree of resiliency, representation, and redundancy needed for the species to tolerate stochastic events, catastrophic events, and adapt capacity. Resiliency is a function of demographic and habitat factors that are necessary to maintain abundance, distribution, and reproduction. Redundancy was assessed according to the number and distribution of populations. For the smallscale darter to adapt to both near-term and long-term changes in its physical and biological environment (representation), the species needs highly resilient populations distributed across its historical range within the Middle and Lower Cumberland River basin. These populations should occupy multiple tributaries, in addition to the core populations within the mainstem of a stream, which provides redundancy for the species. Within these populations, sufficient population size must be maintained in order to preserve enough genetic diversity to respond to shifting selection pressures and any unexpected stochastic events, such as introductions of novel disease or invasive species (Sgro et al. 2011, entire; Forester et al. 2022, entire).

CURRENT CONDITION

The species is currently extant in all four of its historical tributaries within the Cumberland River System: Stones River, Harpeth River, Red River, and Little River. In the Stones River, the species was historically known from the downstream portions of the West Fork of the Stones River and in the mainstem Stones River downstream from the East and West forks confluence. However, recent surveys have not detected them in the West Fork, and the mainstem Stones River is no longer suitable for smallscale darters because of J. Percy Priest reservoir (Johansen et al. 2017, p. 61 and Appendix A-2). The 2015 survey found smallscale darters at four of seven historical sites that had not been impounded. In 2022, smallscale darters were found at an additional site on the East Fork Stones at Readyville Mill Dam.

In the Harpeth River, recent surveys in 2015 have collected smallscale darters in the Harpeth River mainstem, as well as Big Turnbull Creek in Cheatham, Dickson, and Williamson counties, Tennessee. The species was collected at all the historical sites visited during the 2015 survey and at a new site in Franklin, Tennessee during a dam removal monitoring project (Johansen et al. 2017, p. 61 and Appendix A-2). Smallscale darters are known from over 70 miles of the Harpeth River and 13 miles of Big Turnbull Creek.

In the Red River, smallscale darters occur in the Red River mainstem, South Fork Red River, and Whippoorwill Creek in Logan County, Kentucky and Robertson County, Tennessee. There are

historical records for Elk Fork in Robertson, Tennessee, but the 2015 survey resulted in zero smallscale darter detections, possibly because the site was rated as suboptimal habitat (Johansen et al. 2017, pp. 61–62).

In the Little River, surveys in completed in 2010 and 2015 collected smallscale darters in Trigg and Christian Counties, Kentucky in the mainstem Little River, North Fork Little River, South Fork Little River, Sinking Fork, and Casey Creek. The 2015 survey found the species at the two historical sites visited, and a 2010 survey of the Little River watershed found smallscale darters at all historical sites visited (Johansen et al. 2017, p.61; Riggs 2011, p.45).

Overall resiliency for the Harpeth River, Red River, and Little River is moderate-high, and the Stones River has moderate overall resiliency (Table 2). The best available information indicates that population resiliency of smallscale darters has not been impacted by these developed land types (i.e., urban and agriculture) such that they are not able to withstand environmental stochasticity.. While each population exhibits at least moderate resiliency, microsatellite genetic data provide evidence that the four populations are currently isolated from one another (Johansen et al. 2022, entire), resulting in moderate representation and redundancy for the species. Genetic information indicates smallscale darter has maintained moderate levels of genetic diversity despite having isolated populations, as evidenced by higher than expected heterozygosity in samples from each population and low inbreeding coefficients.

Moderate representation and redundancy, in addition to moderate or higher resiliency of all populations, increases the likelihood that the species could withstand a potential catastrophic event such as a pollutant spill or flood scour despite isolation of populations. This ability stems from the likely historical gene flow among the four populations and the smallscale darter’s ability to adapt to changing environmental conditions, as evidenced by mitochondrial DNA data and observed levels of genetic diversity. In place of physical connectivity to enable gene flow going forward, the moderate genetic diversity of the species indicates the adaptive potential of smallscale darter will facilitate populations in withstanding changing environmental conditions throughout the Cumberland basin. For further details on current species representation and redundancy, please refer to the SSA Report (Service 2022, pp. 26–28).

Table 2. Current conditions of the four occupied watersheds based on the metrics in Table 1 and averaged for the total score where High = 3, Moderate = 2, and Low = 1. The urban and agricultural land cover metrics are combined before averaging as described in Table 1. *Red River predicted abundance based on 3 sites in Tennessee. **Little River predicted calculated with inclusion of collections from Riggs 2011. ***Habitat scores for Red River and Little River include surveys from KDOW.

Metric	Stones River	Harpeth River	Red River	Little River
Average Predicted	159 Moderate	495 High	124* Moderate	341** Moderate

Abundance per 75m				
Stream System Complexity	1 occupied stream Low	2 occupied streams Moderate	3 occupied streams High	5 occupied streams High
Visual Habitat Score	134.5 Moderate	155 High	144*** High	144*** High
Percent Urban Land Cover	19.57% Moderate	15.62% Moderate	9.27% High	8.04% High
Percent Agricultural Land Cover	33.55% High	28.8% High	73.49% Moderate	59.77% Moderate
Combined Land Cover Score	Moderate	Moderate	Moderate	Moderate
Total Resiliency Score	Moderate (1.75)	Moderate-High (2.5)	Moderate-High (2.5)	Moderate-High (2.5)

FUTURE CONDITION

The smallscale darter is impacted by habitat destruction and degradation from urbanization. Accordingly, three plausible future scenarios were forecasted using the same thresholds as in current condition for percent urban (i.e., developed) and agricultural land cover types, which was done to enable direct comparisons to current condition for any of the 3 Rs. Scenarios were based on the land cover change projected in the US Geological Survey (USGS) from the FORE-SCE (FOREcasting SCEnarios of Land-use Change) model (A1B, A2, B1), which combined related land use categories for Developed and Agricultural lands. The FORE-SCE was developed using current and past land cover trends, historical agricultural data and the Intergovernmental Panel on Climate Change's (IPCC) Special Report on Emissions Scenarios (SRES) to incorporate socioeconomic, land use, and potential climate change effects into predictions for land cover in the future (Nakicenovic et al. 2000, pp. 3-5; Stohl et al. 2014, entire). A 30-year interval was selected because this was the maximum timeframe that would allow for reliable predictions on relevant land cover changes in the species' range and how that would impact the resiliency of each population. To avoid autocorrelation of land cover, habitat, and predicted abundance, we only used predicted land use metrics to project future resiliency.

Under the first scenario, A1B, we expect to see rapid economic growth across the whole species' range, with accompanying human population growth that is expected to slow as we get closer to 2050. Under the second scenario, A2, human growth will be more uneven across the landscape, but the human population is expected to grow consistently (Nakicenovic *et al.* 2000, p. 5). Under

the third scenario, B1, human growth and technological advances will be distributed evenly across regions. The human population and economic growth will be rapid and widespread, and there will be advances in efficient and clean technology that are not necessarily focused on conservation directly. For further details on future condition methods, please refer to Chapter 5 of the SSA report (Service 2022, pp. 29-30).

While the scenarios showed slightly different levels of land cover change, the resiliency for each watershed remains moderate, except for the Stones River in Scenario A1B which was projected as Moderate-Low. No populations were projected to be extirpated under any of the scenarios, and redundancy and representation levels were maintained similar to current. For further details on future species condition, please refer to Chapter 5 of the SSA Report (Service 2022, p. 30-35).

Table 3. Resiliency scores compared across future scenarios and current condition.

Watershed	Current Condition	Scenario A1B	Scenario A2	Scenario B1
Stones	Moderate	Moderate-Low	Moderate	Moderate
Harpeth	Moderate-High	Moderate	Moderate	Moderate
Red	Moderate-High	Moderate	Moderate	Moderate
Little	Moderate-High	Moderate	Moderate	Moderate

FINDING

Regulatory Framework

Section 4 of the Act (16 U.S.C. 1533) and its implementing regulations (50 CFR part 424) set forth the procedures for determining whether a species is an “endangered species” or a “threatened species.” The Act defines an endangered species as a species that is “in danger of extinction throughout all or a significant portion of its range,” and a threatened species as a species that is “likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.” The Act requires that we determine whether any species is an “endangered species” or a “threatened species” because of any one or a combination of the following factors:

- (A) The present or threatened destruction, modification, or curtailment of its habitat or range;
- (B) Overutilization for commercial, recreational, scientific, or educational purposes;
- (C) Disease or predation;
- (D) The inadequacy of existing regulatory mechanisms; or
- (E) Other natural or manmade factors affecting its continued existence.

These factors represent broad categories of natural or human-caused actions or conditions that could have an effect on a species’ continued existence. In evaluating these actions and conditions, we look for those that may have a negative effect on individuals of the species, as well as other actions or conditions that may ameliorate any negative effects or may have positive

effects.

The Act does not define the term “foreseeable future, which appears in the statutory definition of “threatened species.” Our implementing regulations at 50 CFR 424.11(d), as revised in 2019, set forth a framework for evaluating the foreseeable future on a case-by-case basis. The term “foreseeable future” extends only so far into the future as we can reasonably determine that both the future threats and the species’ responses to those threats are likely. In other words, the foreseeable future is the period of time in which we can make reliable predictions. “Reliable” does not mean “certain”; it means sufficient to provide a reasonable degree of confidence in the prediction. Thus, a prediction is reliable if it is reasonable to depend on it when making decisions.

It is not always possible or necessary to define the foreseeable future as a particular number of years. Analysis of the foreseeable future uses the best scientific and commercial data available and should consider the timeframes applicable to the relevant threats and to the species’ likely responses to those threats in view of its life-history characteristics. Data that are typically relevant to assessing the species’ biological response include species-specific factors such as lifespan, reproductive rates or productivity, certain behaviors, and other demographic factors.

Status Assessment

Status Throughout All of Its Range

After evaluating threats to the species and assessing the cumulative effect of the threats under the section 4(a)(1) factors, we determined that the smallscale darter does not meet the definition of an endangered species throughout all its range. In our assessments of viability for the smallscale darter, we considered habitat destruction and degradation resulting from urbanization (Factor A), agricultural impacts (Factor A), impoundments (Factor A), and impaired water quality (Factor A). We also evaluated population isolation (Factor E) and climate change (Factor E). Of those threats, those concerning habitat destruction and degradation were identified as the primary threats influencing the species.

The species is present throughout its historical geographic area and is currently exhibiting moderate representation and redundancy rangewide. Three of the four populations (i.e., Harpeth, Red, and Little Rivers) currently exhibit moderate-high resiliency. In the fourth population, Stones River, resiliency is currently moderate. While resiliency in Stones River is lower than the three other populations, smallscale darter populations are likely able to withstand stochastic events because of its broad distribution within these watersheds. This moderate to moderate-high resiliency of smallscale darter populations, combined with the species occurring throughout its historical area, provides redundancy, and increases the species’ ability to withstand catastrophic events. Given the moderate to moderate-high resiliency populations distributed across the historical range, the species is not currently in danger of extinction throughout its range. Thus, after assessing the best available information, we conclude that smallscale darter is not in danger of extinction throughout all of its range.

Therefore, we proceed with determining whether smallscale darter is likely to become endangered within the foreseeable future throughout all of its range. For smallscale darter, we identified the foreseeable future as 30 years, the extent to which we could reliably predict both relevant land cover change in the species' range and the species' response to these changes. The smallscale darter is expected to maintain at least moderate resiliency for the foreseeable future in all but one scenario for one watershed. In Scenario A1B, the Stones River is projected to decline to moderate-low resiliency because of increased urbanization. However, in scenarios A2 and B1, all populations are projected to maintain moderate resiliency, resulting in continued moderate redundancy. In all three future scenarios, we project the species to be extant in the entirety of its known range with moderate resiliency for all populations in two of the three scenarios. We determined that the magnitude and scale of impacts projected in the future will not impact the species such that it is likely to become an endangered species in the foreseeable future. After assessing the best available information, we conclude that smallscale darter is not likely to become an endangered species within the foreseeable future throughout all of its range.

Status Throughout a Significant Portion of Its Range

Under the Act and our implementing regulations, a species may warrant listing if it is in danger of extinction or likely to become so in the foreseeable future throughout all or a significant portion of its range. Having determined that the smallscale darter is not in danger of extinction or likely to become so in the foreseeable future throughout all of its range, we now consider whether it may be in danger of extinction or likely to become so in the foreseeable future in a significant portion of its range—that is, whether there is any portion of the species' range for which it is true that both (1) the portion is significant; and (2) the species is in danger of extinction now or likely to become so in the foreseeable future in that portion. Depending on the case, it might be more efficient for us to address the “significance” question or the “status” question first. We can choose to address either question first. Regardless of which question we address first, if we reach a negative answer with respect to the first question that we address, we do not need to evaluate the other question for that portion of the species' range.

In undertaking this analysis for smallscale darter, we chose to address the status question first. We began by identifying portions of the range where the biological status of the species may be different from its biological status elsewhere in its range. For this purpose, we considered information pertaining to the geographic distribution of (a) individuals of the species, (b) the threats that the species faces, and (c) the resiliency condition of populations.

We evaluated the range of the smallscale darter to determine if the species is in danger of extinction now or likely to become so in the foreseeable future in any portion of its range. The range of a species can theoretically be divided into portions in an infinite number of ways. We focused our analysis on portions of the species' range that may meet the definition of an endangered species or a threatened species. For smallscale darter, we considered whether the threats or their effects on the species are greater in any biologically meaningful portion of the

species' range than in other portions such that the species is in danger of extinction now or likely to become so in the foreseeable future in that portion. We examined the following threats: habitat destruction and degradation resulting from urbanization agriculture, impoundments, and impaired water quality; population isolation; and climate change, including cumulative effects.

We looked across the smallscale darter's range and found that the Harpeth and Stones River populations may have higher exposure to effects of urbanization due to proximity to Nashville. As previously mentioned, the Stones River population currently exhibits moderate resiliency, which is a lower level than the moderate-high resiliency exhibited by the three other populations. Despite a comparatively lower level of resiliency, the Stones River population has a moderate level of resiliency to withstand stochastic events. In addition, even though this area has the highest percent urban land cover, the Stones River population has moderate-average predicted abundance, contributing to a moderate current resiliency for Stones River. The Stones River population has maintained moderate numbers in locations with lower quality habitat affected by agriculture and development, which is indicative how the current resiliency for this population is sufficient to withstand stochastic events. Lastly, the best available information suggests their preferred microhabitat of steeper riffles with larger substrate is less susceptible to sedimentation than depositional areas of the stream. Additionally, the Harpeth River population in Tennessee currently has the highest average predicted abundance of the four populations and moderate-high total resiliency. Further, the higher exposure of urbanization does not appear to have a greater impact on those populations, as evidenced by higher predicted abundance and resulting resiliency of those populations. Thus, the best available information indicates that, despite the effects of urbanization in the Stones River and Harpeth River, the smallscale darter is not currently in danger of extinction in this portion of its range. Given the current level of resiliency (moderate/moderate-high) for the four populations of the smallscale darter, we found no portion of the range where the biological condition of the species differs from its condition elsewhere in its range such that the current status of the species in that portion differs from any other portion of the species' range.

We then considered whether there was any portion of the range that may have a different status within the foreseeable future. We examined the Stones River portion further, given this portion of the range is projected to exhibit a lower resiliency (moderate-low) than current condition under one of three future scenarios, A1B, due to increased urbanization over the next 30 years. However, the Stones River population is projected to maintain moderate resiliency under the two other scenarios, A2 and B1. Further, even under scenario A1B, projected land cover metrics are such that the current average predicted abundance of the smallscale darter would allow the Stones River portion to withstand projected threats into the foreseeable future and maintain sufficient resiliency such that it is not in danger of extinction. Therefore, we find the Stones River portion does not have a different status than the rest of the range in the foreseeable future. Accordingly, no portions of the range are expected to have a different status within the foreseeable future.

Therefore, we find that the species is not in danger of extinction now or likely to become so in the foreseeable future in any significant portion of its range. This does not conflict with the courts' holdings in *Desert Survivors v. Department of the Interior*, 321 F. Supp. 3d 1011, 1070-74 (N.D. Cal. 2018), and *Center for Biological Diversity v. Jewell*, 248 F. Supp. 3d 946, 959 (D. Ariz. 2017) because, in reaching this conclusion, we did not apply the aspects of the Final Policy on Interpretation of the Phrase "Significant Portion of Its Range" in the Endangered Species Act's Definitions of "Endangered Species" and "Threatened Species" (79 FR 37578; July 1, 2014), including the definition of "significant" that those court decisions held to be invalid.

Determination of Status

Our review of the best available scientific and commercial information indicates that the smallscale darter does not meet the definition of an endangered species or a threatened species in accordance with sections 3(6) and 3(20) of the Act. Therefore, we find that listing the smallscale darter is not warranted at this time.

COORDINATION WITH STATES

While conducting the smallscale darter SSA report, we coordinated with partner reviewers from Tennessee Wildlife Resource Agency, Austin Peay State University, Kentucky Fish and Wildlife Resources, and Kentucky Nature Preserves. Five individuals from University of Tennessee, Tennessee Tech University, Tennessee Aquarium Conservation Institute, and University of the South were contacted for peer review. We received and incorporated valuable feedback from University of Tennessee, Tennessee Tech University, and Tennessee Aquarium Conservation Institute.

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Date: 11.15.2023

A handwritten signature in blue ink that reads "Martha Williams". The signature is fluid and cursive, with a long horizontal stroke extending to the right.

Martha Williams,
Director,
U.S. Fish and Wildlife Service

Date of annual review: 15 November 2022
Conducted by: Jonathan Wardell