

Vermilion Darter
(*Etheostoma chermocki*)

5-Year Status Review:
Summary and Evaluation



Photos by Ryan Hagerty, U.S. Fish and Wildlife Service

U.S. Fish and Wildlife Service
Southeast Region
Alabama Ecological Services Field Office
Daphne, Alabama

August 2025

5-YEAR STATUS REVIEW
Vermilion Darter (*Etheostoma chermocki*)

GENERAL INFORMATION

Current Classification: Endangered

Lead Field Office: Alabama Ecological Services Field Office, Jennifer Grunewald, (251) 441-5181

Review Author(s): Jennifer Grunewald, Kameryn Ryce, and Mckenzie Davis, Alabama Ecological Services Field Office, U.S. Fish and Wildlife Service

Reviewers:

Lead Regional Office: Southeast Region, Carrie Straight

Date of original listing: December 28, 2001 (66 FR 59367; November 28, 2001)

Critical Habitat: Critical habitat final rule: December 7, 2010 (75 FR 75913)

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 ([50 CFR 424.11](#)). The U.S. Fish and Wildlife Service (Service) evaluated the best available information about the vermilion darter's (*Etheostoma chermocki*) biology, habitat, and threats to inform this status review.

We announced initiation of this review in the Federal Register on May 11, 2023 (88 FR 30324) with a 60-day comment period. The primary sources of information used in this analysis were the 2001 final listing rule (66 FR 54808), the 2007 recovery plan, the 2011 and 2019 5-year reviews, peer-reviewed reports, agency reports, unpublished survey data and reports from state agencies and others, and personal communication with recognized experts. This review was completed by the U.S. Fish and Wildlife Service, Alabama Ecological Services Field Office, Daphne, Alabama. All literature and documents used for this review are on file at the Field Office. All recommendations resulting from this review are the result of thoroughly reviewing the best available information on vermilion darter. We received one public comment from National Council for Air and Stream Improvement, Inc. (NCASI) providing information on protection of water quality through use of best management practices in forestry operations. All comments received were evaluated and incorporated into this final document as appropriate. All recommendations resulting from this review are the result of thoroughly reviewing the best available information on the vermilion darter.

FR Notice citation announcing the species is under active review:
May 11, 2023 (88 FR 30324)

Species' Recovery Priority Number (RPN) at start of 5-year review ([48 FR 43098](#)):
RPN 2: Vermilion darter is a species with a high degree of threat and a high recovery potential.

Review History:

Previous 5-year reviews recommending no change in status and were signed on August 30, 2011, and August 1, 2019 (Service 2011; Service 2019).

REVIEW ANALYSIS

Listed Entity

Taxonomy and nomenclature

No changes have been made to the taxonomic classification or nomenclature of the vermilion darter and the Service still considers it a valid taxon.

Distinct Population Segment (DPS) ([61 FR 4722](#))

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

Final Recovery Plan for the Vermilion Darter (*Etheostoma chermocki*), June 20, 2007.

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. 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 relies on the five-factors as described section 4(a) of the Act ([84 FR 45020](#)).

The Service believes these criteria are appropriate and relevant; however, no criteria have currently been met.

Based on the recovery plan (Service 2007), delisting of the vermilion darter will be considered when:

1) *Populations of vermilion darters and its habitat within its known range in Turkey Creek are shown to be protected from present and foreseeable threats to*

the point where listing is no longer required through the implementation of activities including stewardship, outreach, best management practices, securing conservation easements or acquisitions, and ensuring adequate regulatory enforcement.

In the North Creek - Turkey Creek watershed (HUC: 031601110306) the known range of the vermilion darter has expanded approximately 0.33 miles (mi) (531 meters (m)) upstream and 4.1-mi (6.6 kilometers (km)) downstream. Though expansion of the range has occurred, some recovery activities occurred, and land holdings protect portions of the species habitat, the Service believes on going and foreseeable threats remain, as described below.

2) *Stable or increasing population trends for at least 10 years throughout its known range are verified through monitoring and surveys.*

There is no evidence to suggest that the species has been increasing or dramatically decreasing over the last 5-10 years within its known range.

3) *Suitable flows and water quality in Turkey Creek supporting the vermilion darter are determined through recovery tasks and assured, through State or local groundwater management plans, or water conservation plans.*

Currently, suitable in-stream flows and water quality parameters in Turkey Creek that support the vermilion darter are not addressed in state, county or local management or conservation plans and not consistently implemented (see Factor D, below).

4) *An average monthly reading of 10 NTU (Nephelometric Turbidity Units), a unit used to measure sediment discharge, or 15 mg/L TSS (Total Suspended Solids) or less discharge into the Turkey Creek watershed within and upstream of the vermilion darter's range is being attained and documented as occurring for a minimum of 10 consecutive years. Information will be compiled from sampling water quality monthly throughout the year during base, low and high flows.*

Sedimentation is a severe problem and can be related to both non-point and point source pollution in the Turkey Creek drainage. Turbidity, which is a measure of cloudiness in the water and the amount of suspending particles, can increase dramatically following a rainfall event. Previously, synoptic observations of large swings in turbidity have been documented (Drennen pers obs. 2009), but regular, or continuous monitoring, has not taken place, thus, we have no information to support this criterion has been met.

5) *A captive vermilion darter population of 20 pairs (40 individuals) has been established and successfully propagated for augmentation.*

There are currently no vermilion darters in captivity to initiate a propagation and reintroduction program. Therefore, this criterion is not met.

Biology and Habitat Summary

A detailed review of the species' biology and habitat and threats information can be found in the species' listing, recovery plan, and previous 5-year status reviews (Service 2001, 2007, 2011, 2019).

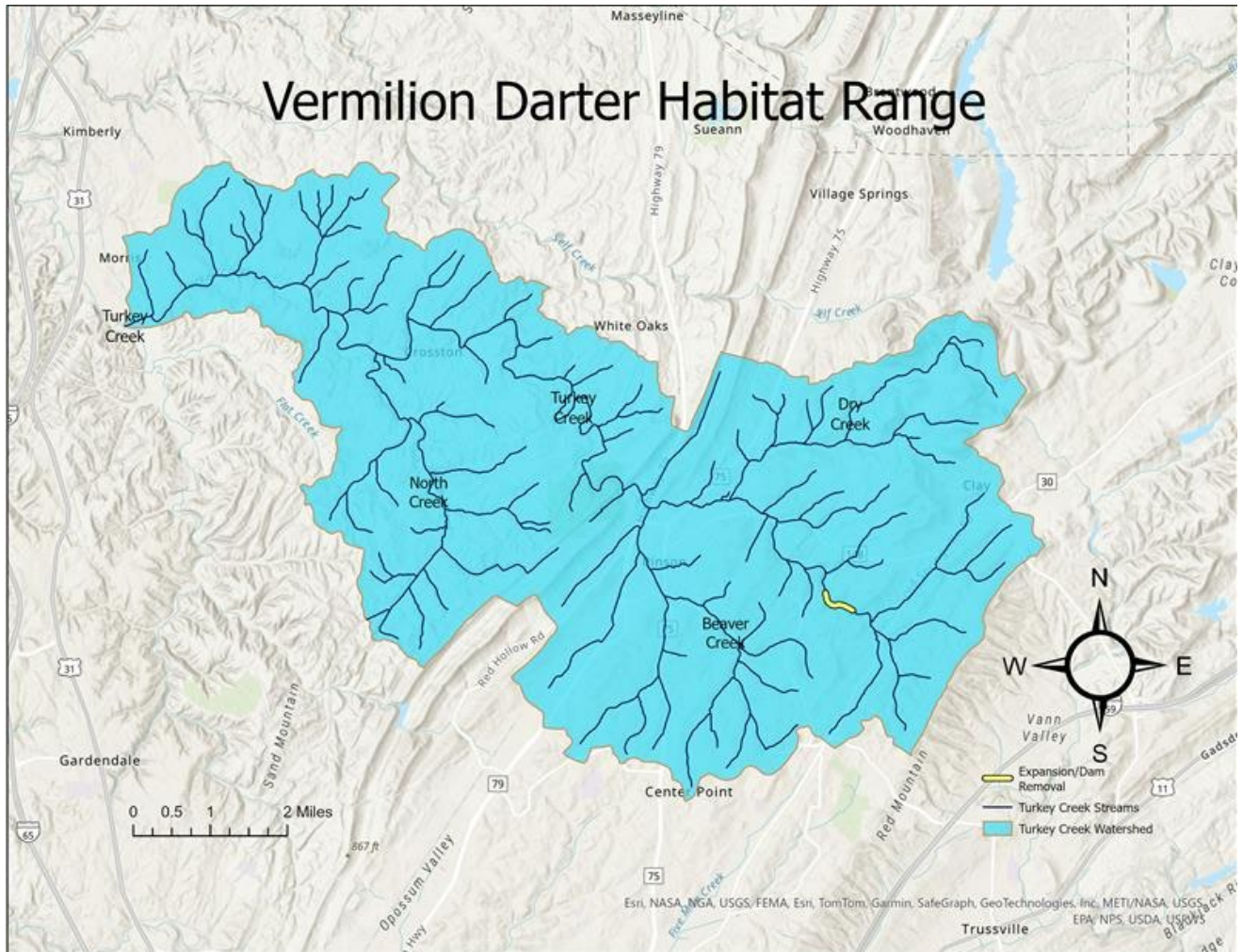


Figure 1. Map of potential vermilion darter range in the Turkey Creek watershed, Alabama.

The vermilion darter is found only in the Turkey Creek drainage, a tributary of the Locust Fork of the Black Warrior River, Jefferson County, Alabama (North Creek - Turkey Creek watershed (HUC: 031601110306)). The current range of the vermilion darter is restricted to localized sites within the upper mainstem reach of Turkey Creek and four tributaries in Jefferson County, AL (Figure 1). Extensive surveys in similar habitats have failed to locate this species outside of its current drainage (Fix and Kuhajda 2019; Service 2019 and references therein).

The historic population size of the vermilion darter within the Turkey Creek drainage is unknown. However, an estimate of the ancestral population size was calculated based on an effective population size estimate by Blanco and Mayden (1999). The estimated ancestral population size is 10,645-11,485 individuals. In the 1960s and 1970s, the vermilion darter was common at certain sites in Turkey Creek but began decreasing and became rare by the early 1990's (Boschung et al. 1992).

Relative abundance through the years (see Service 2001, 2011, and 2019 for details):

- 1998-1999 – estimated between 1,847 and 3,238 individuals (Blanco and Mayden 1999) based on captures in Turkey Creek mainstem and the tributaries of Dry and Beaver creeks.
- 2003 – 107 individuals detected between March and August 2003 within these same areas as the 1998-1999 surveys, suggesting a decline in population size (Stiles and Blanchard 2003).
- 2004-2009 – surveys indicate overall sparseness, sporadic and isolated nature of the vermilion darter (Service 2011 and references therein)
- 2019 – although no population estimate was made, the range for the vermilion darter within the Turkey Creek watershed totaled 11.03 mi (17.75 km) (which includes 7.6 mi (12.2 km) in the Turkey Creek proper, 1.0 mi (1.6 km) in Dry Branch, and 2.4 mi (3.9 km) in Penny Spring (Service 2019).
- 2019 – expansion of the range totaling a 4.1-mi (6.6 km) increase from the previously recorded downstream range. The probable factors contributing to the expansion include the upstream dam removal and improved water quality downstream (Fix and Kuhajda 2019).
- 2022 – a streambank stabilization project by Freshwater Land Trust restored the natural channel and eroding banks in Turkey Creek, improving habitat for the vermilion darter, aquatic organism passage, and water quality.
- 2023 – expansion of range following the removal of Old Shadow Lake Dam (2013) (Figure 1). There was an upstream expansion of approximately 0.33 miles (531 m) (J Drummond pers. comm 2023). The probable factors contributing to the expansion include the upstream dam removal and improved water quality.
- 2025 – current known range is described above under year 2023. We have no current species numbers or population estimates.

The Turkey Creek Nature Center and Preserve is an organization that protects approximately 10% of the Turkey Creek mainstem and 655 acres (2.65 km²) of intact streamside forest. Freshwater Land Trust protects an additional approximately 20% of the mainstem and 771 acres (3.12 km²) of riparian buffer. A streambank stabilization and in-stream restoration project on Turkey Creek in FLT's Shadow Lake property was completed in 2022. This project returned a portion of the channel to its original location by reconstructing the banks, creating side-stream water storage, stabilizing the banks with log sills and woody debris in two areas of the channel, and replanting vegetation along the banks (3.6 total acre (0.014 km²) project site).

The Birmingham Metropolitan area is home to three federally listed species of percids: watercress darter (*Etheostoma nuchale*), vermilion darter (*Etheostoma chermocki*), and the rush

darter (*Etheostoma phytophilum*). Because these species are geographically restricted to an area that has long been subjected to development pressures and experienced industrial perturbations, partnership-driven protection, such as the Urban Darter Conservation Fund, and enhancement of their fragmented habitats has been and will continue to be invaluable to their overall persistence and recovery (Service 2021). The Urban Darter Conservation Fund project provides opportunity to increase community involvement while simultaneously improving the conservation status of the watercress, vermilion, and rush darters. The project includes habitat improvement workdays, community education, and gathering data through habitat monitoring and species surveys.

The vermilion darter species complex was previously described by Boschung et al. (1992) and later examined genetically by Clabaugh et al. (1996). This complex, native to the Black Warrior River system of Alabama, which includes vermilion darter, has recently been divided into six new species, including the previously described vermilion darter and Warrior darter (*E. bellator*) (Brownstein et al. 2025). The previous taxonomy and range of the vermilion darter remain the same.

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. A summary of this assessment is detailed below.

Factor A: The present or threatened destruction, modification, or curtailment of its habitat or range.

The limited range of the vermilion darter is in the industrial and urbanized areas of the City of Pinson. Because of the vermilion darter's limited range, the threat of declining water quality from stormwater runoff is the greatest impact facing the species.

This threat is ongoing as evidenced by impacted water quality identified by the state. The Alabama Department of Environmental Management (ADEM) has placed Turkey Creek in the Black Warrior Basin, Jefferson County, on the 303(d) list for Pathogens (*E. coli*) (AL03160111-0307-100). Records at ADEM station TRKJ-1A from 2021 show that the *E. coli* criterion was exceeded in 2 out of 8 samples (2024 ADEM). No Total Maximum Daily Loads (TMDL) has been developed.

Another threat to habitat is illustrated by an example that has occurred in the Turkey Creek mainstem. Chert, a type of rock that is typically restricted to the headwater areas of the Turkey Creek watershed, has washed into and infiltrated portions of mainstem Turkey Creek, altered natural flows, and rerouted sections of the stream. The source is believed to be land clearing in upland areas. In 2022, a streambank stabilization project restored the natural channel and eroding bank in Turkey Creek, improving habitat for the darter, aquatic organism passage, and water quality.

Vicariance, which describes two similar species separated by a physical barrier, has normally been considered the primary source of allopatric speciation in freshwater fish throughout southeastern North America. However, based on the relative timing of rock exposure, it seems more reasonable that changes in dispersal patterns towards carbonate rock habitats have played a crucial role in allowing allopatric speciation (Kim et al., 2023; Wiley and Mayden, 1985; Mayden, 1988; Near et al., 2000; Pramuk et al., 2007; Baker et al., 2013; Mayden and Allen,

2015; Gilbert et al., 2017; Near and Kim, 2021; Hoagstrom and Echelle, 2022). The findings from Kim et al. (2023) highlight that the presence of exposed carbonate rock likely contributed to the allopatric speciation of vermilion darters. This suggests that the dispersal patterns of vermilion darters were significantly influenced by environmental and geological changes.

Factor B: Overutilization for commercial, recreational, scientific, or educational purposes.

We are not aware of overutilization for commercial, recreational, scientific, or education purposes of the vermilion darter.

Factor C: Disease or predation.

Predation undoubtedly occurs within all sites for the vermilion darter. There is no evidence to suggest that disease or natural predators threaten the species in the Turkey Creek mainstem or in its tributaries.

The invasive virile (Northern) crayfish (*Faxonius virilis*) has been observed feeding on live watercress darters (*Etheostoma nuchali*) at Roebuck Spring, Birmingham, Alabama (Duncan et al. 2008). Although the virile crayfish co-occurs with the vermilion darter, predation has not been observed nor is considered a high potential threat (Brooke pers. comm. 2009).

Factor D: The inadequacy of existing regulatory mechanisms.

The vermilion darter and its habitats are afforded some protection through state laws the Code of Alabama §§ 220-2-92, which makes it unlawful to take or attempt to take, capture, or kill the vermilion darter. The species is also afforded some protection from water quality and habitat degradation under the Clean Water Act of 1972 (33 U.S.C. 1251 et seq.) the Alabama Water Pollution Control Act, as amended, 1975 (Code of Alabama, §§ 22-22-1 to 22-22-14). Although these laws offer some protection, declines in distribution and abundance of the species across its range demonstrate that existing regulatory mechanisms in Alabama, are still inadequate to fully protect this species from the ongoing threats.

Nonpoint constituents such as silt, nutrients, and other contaminants may not be sufficiently regulated. Agriculture, suburban, and urban land-uses continue to expand in the Turkey Creek watershed in the existing ranges of this species. Further, these land-use changes alter runoff patterns and flow with unknown consequences to the remaining populations. Though forestry is a small land use type in the range of the species, forestry uses voluntary best management practices (BMPs). BMPs are required for third party-certified landowners and landowners that supply wood to mills with third party-certified fiber sourcing. The requirement for BMP use by forest certification programs provides certainty that BMPs will be implemented for fiber sourcing from small to large, private forested lands. Few regulatory mechanisms exist to address land-use changes that may indirectly affect stream habitat remote from the disturbance.

Section 404 of the Clean Water Act regulates the discharge of dredged or fill material into waters of the United States, including wetlands. Any activities in waters of the United States are regulated under this program, such as water resource projects, infrastructure development, and

mining projects. While a single project is unlikely to jeopardize the continued existence of any one species, the collective impact of multiple development projects on finite habitat is often not assessed on a permit-by-permit case.

The ADEM has placed Turkey Creek in the Black Warrior Basin, Jefferson County, on the 303(d) list for Pathogens (*E. coli*) (AL03160111-0307-100). Records show that the *E. coli* criterion was exceeded in 2 out of 8 samples (ADEM 2024), no TMDL has been developed.

Factor E: Other natural or manmade factors affecting its continued existence.

Fragmentation of the species' habitat has isolated the populations within the Turkey Creek system and reduced space for rearing and reproduction and population maintenance. Fragmentation and resulting isolated populations have likely reduced adaptive capabilities and increased the likelihood of local extinctions (Hallerman 2003; Burkhead et al. 1997).

Although Alabama has not seen warming that other states have seen since the beginning of the 20th century, models indicate an increase in temperatures (Runkle et al. 2022). These same models predict increases in extreme precipitation frequency and intensity. Extreme precipitation can result in increases in sedimentation and increases in temperature is expected to result in co-occurring increases in water temperature. These changes are expected to impact fishes through disruption to their physiology (such as temperature tolerance, dissolved oxygen needs, and metabolic rates), life history (such as timing of reproduction, growth rate), and distribution (range shifts, migration of new predators) (Jackson and Mandrak 2002; Heino et al. 2009; Strayer and Dudgeon 2010; Comte et al. 2013).

Synthesis

The vermilion darter is a medium-sized darter reaching about 2.8 inches (7.1 centimeters) in total length and is distinguished by extensive vermilion coloration on the lower sides and belly. The species is found only in the Turkey Creek drainage, a tributary of the Locust Fork of the Black Warrior River, Jefferson County, Alabama. Though the known range has extended in Turkey Creek, the range remains restricted to localized sites within the upper mainstem reach of Turkey Creek and four tributaries. Degradation of water quality and substrate components of its habitat due to sedimentation and other pollutants remain the largest threats to the species. Because of ongoing threats and the current condition of the species, this species continues to meet the definition of an endangered species.

RECOMMENDED FUTURE ACTIVITIES

A detailed discussion of recovery actions and criteria are presented in the Recovery Plan and Recovery Implementation Strategy (Service 2007). During this status review, targeted potential recovery activities have been identified and are included below.

Recovery Activities

- Consistent, standardized monitoring methods are needed across all populations for a long-term period to obtain an accurate assessment of the species' status.
- Regular monitoring of the invertebrate biodiversity, gravel erosion, and sediment change in relation to biofilm and periphyton in the Turkey Creek watershed is needed.
- Preliminary sampling of Endocrine Disruptor Chemicals that the Turkey Creek Waste Water Treatment Plant needs to be expanded into a systematic monitoring program throughout selected areas in the watershed.
- Monitoring of basic parameters of water quality data (conducted since 2007, which is archived in the Alabama Water Watch site), needs to continue.
- Utilize Partners for Fish and Wildlife Program for additional restoration efforts specifically targeting hilltop development to halt the resulting small gravel erosion into Turkey Creek and small tributaries.
- Continue to obtain and coordinate restoration efforts with interested parties (the City of Pinson, Jefferson County, the State of Alabama, landowners, Freshwater Land Trust, Turkey Creek Nature Preserve, and the Black Warrior River Keepers) to protect Turkey Creek, Beaver Creek, the Unnamed Tributary to Beaver Creek, Dry Creek, and Dry Branch.
- Installation of additional stream gages in the occupied headwaters and tributaries to gather information and assess water quantity and quality in vermilion darter habitat.

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RESULTS / SIGNATURES

U.S. Fish and Wildlife Service Status Review of Vermilion Darter

Status Recommendation:

On the basis of this review, we recommend the following status for this species ([50 CFR § 424.11](#)). 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 Act.

- Downlist to Threatened.
- Uplist to Endangered.
- Delist:
 - The species is extinct.*
 - The species is recovered.*
 - New information indicates 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.*
- No change needed.

FIELD OFFICE APPROVAL:

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

Approve _____